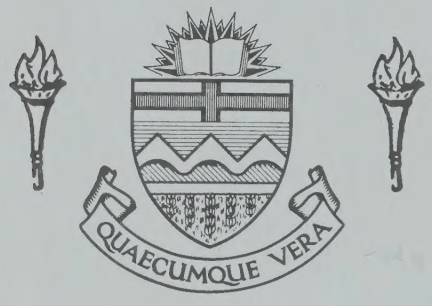
University of Alberta Library
0 1620 2670082 1

91-079

Ex libris
universitatis
albertaensis



UNIVERSITY OF ALBERTA
RELEASE FORM

NAME OF AUTHOR: MAVIS ANGELINE JACOBS

TITLE OF THESIS: DOES EXPOSURE TO POSSIBLE CAPITAL COST ALLOWANCE CHANGES INFLUENCE THE CHOICE OF ACCOUNTING DEPRECIATION POLICY?
An empirical analysis of Canadian firms

DEGREE: MASTER OF BUSINESS ADMINISTRATION

YEAR THIS DEGREE GRANTED: 1991

PERMISSION IS HEREBY GRANTED TO THE UNIVERSITY OF ALBERTA LIBRARY TO REPRODUCE SINGLE COPIES OF THIS THESIS AND TO LEND OR SELL SUCH COPIES FOR PRIVATE, SCHOLARLY OR SCIENTIFIC RESEARCH PURPOSES ONLY.

THE AUTHOR RESERVES OTHER PUBLICATION RIGHTS, AND NEITHER THE THESIS NOR EXTENSIVE EXTRACTS FROM IT MAY BE PRINTED OR OTHERWISE REPRODUCED WITHOUT THE AUTHOR'S WRITTEN PERMISSION.

Date: January 28, 1991

UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

THE UNDERSIGNED CERTIFY THAT THEY HAVE READ, AND RECOMMEND TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH FOR ACCEPTANCE, A THESIS ENTITLED

DOES EXPOSURE TO POSSIBLE CAPITAL COST ALLOWANCE CHANGES INFLUENCE THE CHOICE OF ACCOUNTING DEPRECIATION POLICY?
An empirical analysis of Canadian firms

SUBMITTED BY MAVIS ANGELINE JACOBS IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION

ABSTRACT

Have income tax changes to the capital cost allowance (CCA) system encouraged Canadian firms to change accounting depreciation methods? Discriminant analysis is used to contrast 114 firms that have changed and 141 firms that did not change depreciation methods between 1985 and 1988. Also, change firms are contrasted based on whether the change is income increasing or income decreasing.

The Department of Finance rationalized changes to the CCA system in the planning documents for 1987 tax reform in Canada. Accelerated CCA rates had previously been introduced as investment incentives. However, total CCA claims significantly exceeded accounting depreciation so that, in 1980, the federal tax foregone because of this tax expenditure was $2.3 billion. The tax expenditure from excess CCA claims was targeted as a source of revenue, with the objective being to eliminate excess CCA that could be claimed. Prior to this policy change, there had not been a clear linkage between accounting policy and CCA tax policy since 1954.

Since the Department of Finance focussed on the tax expenditures that result from CCA exceeding accounting depreciation, Canadian firms have an incentive to ensure that excess CCA will decrease. This can be accomplished by increasing accounting depreciation or having the taxation authorities impose CCA rate reductions. To deter the latter, this study hypothesizes that firms will change their depreciation policy so that accounting depreciation more closely approximates CCA, to reduce tax exposure to prospective CCA tax changes. In particular, firms with high tax exposure will select income decreasing depreciation methods.

Firm size (assets), shareholders' equity, leverage (total debt/equity) and deferred tax expense are very significant in differentiating between firms that select income increasing and income decreasing depreciation methods. Deferred tax expense is used to proxy for tax exposure. The discriminant function has a canonical correlation of .32, which is significant at the .02 level, with the classification function being improved by .08. This study is significant for tax policy makers as it reveals the likelihood that CCA tax policy changes are an impetus to firms to change their depreciation methods.

Table of Contents

Chapter 1—Introduction 1

Chapter 2—Depreciation and accounting theory 8
Theory of depreciation 8
Stock price consequences 9
Predicting choice of depreciation method 11
Accounting method choice hypotheses 16

Chapter 3—Depreciation and taxation 19
Capital cost allowance (CCA) system 19
Empirical studies 29
Importance of G.A.A.P. to tax reporting 32
Capital cost allowance policy changes 34
Hypotheses 35

Chapter 4—Research Design 38
Methods 38
Description of discriminant analysis 39
Selection of dependent variables 40
Selection of independent variables 42
Sample data 48
Sample period 49
Financial data 50
Descriptive statistics 52

Chapter 5—Empirical results 53
Wilcoxon matched-pair signed-ranks test 53
Discriminant analysis 55
Discriminant analysis of changes in depreciation methods 60
Comparison of full and custom models 66
Summary of discriminant analysis of firms using different depreciation methods 67
Classification results of discrimination functions 68
Logistic regression 69

Chapter 6—Conclusion 71
Summary of results of discriminant analysis of change firms 71
Limitations of study 73
Future research 76

Bibliography 78

Appendix 1—Positive theory explanatory variables 87
Common influential variables 87
Other influential variables 90

Appendix 2—Variable labels 92

Appendix 3—Financial data 93
Data for ALL firms in sample in alphabetic order by name of company 93
Data for ALL firms in sample in order of largest to smallest by total assets 98
Data for CHANGE firms in sample in order of largest to smallest by total assets 103

Data for NO CHANGE firms in sample in order of largest to smallest by total assets 106

Appendix 4—Histograms 109
Total assets 109
Total capital assets 110
Gross revenue 111
Net income before taxes 112
Deferred tax expense 113
Shareholders equity 114
Capital intensity (Revenue) 115
Total debt/equity 116

Appendix 5—Univariate statistics 117

Appendix 6—Significant variables in full models 118

Appendix 7—Correlation matrix 120

Appendix 8—Method scenarios 121
Scenario 5—Discriminant functions for firms using straight-line and declining balance depreciation methods 122
Scenario 6—Analysis of firms using "other" (excluding DB) and declining balance depreciation methods 123
Analysis and comparison of depreciation method models 124

Appendix 9—Logistic regression 127

Table of Tables

Table 1 t-Test results for depreciation method studies 15
Table 2 Depreciation methods used by corporations 22
Table 3 Objectives of accounting depreciation 22
Table 4 CCA rate changes from tax reform 26
Table 5 Reporting of deferred income taxes 45
Table 6 Identification of outlier firms 51
Table 7 Distribution of sample among different categories 52
Table 8 Wilcoxon matched-pair signed-ranks test 54
Table 9 Groupings of firms for discriminant analysis 56
Table 10 Selected variables for custom model 58
Table 11 Correlation matrix of variables in custom model 59
Table 12 Scenario 1 60
Table 13 Scenario 2 62
Table 14 Scenario 3 63
Table 15 Scenario 4 65
Table 16 Summary of change firm analysis 66
Table 17 Classification of firms - discriminant analyses 68
Table 18 Comparison of multivariate results 70
Table 19 Economic variable labels 92
Table 20 Univariate statistics 117
Table 21 Significant variables - full models 118
Table 22 Pearson correlation coefficients 120
Table 23 Groupings of firms for discriminant analysis 121
Table 24 Scenario 5 122
Table 25 Scenario 6 124

Chapter 1—Introduction

Capital cost allowance is the name given in Canada to the permissible deduction of the cost of capital assets to arrive at taxable income. Many changes to the allowable maximum capital cost allowance rates were proposed in 1985 in conjunction with a major reform of the income tax system. The changes were formalized in 1987 and were enacted effective January 1, 1988. The effect of these changes was to make capital cost allowance rates closer to accounting depreciation rates, with the latter presumed to approximate economic depreciation rates. The rationale for the changes was that accelerated capital cost allowance rates were distorting investment decisions. More important, in terms of public policy, the opportunity cost to the government from this tax expenditure, the associated tax revenue foregone, was staggering.

With continuing government deficits, further reductions in capital cost allowance rates may be proposed in an attempt to increase tax revenues. Before such changes would be enacted, the taxation authorities would likely compare accounting depreciation to capital cost allowances to determine if capital cost allowances are too generous. To ensure that this comparison is favourable for business, managers may change accounting depreciation policies to increase current depreciation expense. Then, when the comparison with the capital cost allowance system is made, capital cost allowance claims would not appear excessive and reductions in capital cost allowance rates would be harder to justify.

Depreciation methods and rates are prescribed for income tax purposes, and firms have no discretion in choosing the method, or the maximum rates, used to amortize the cost of capital assets. The methods and maximum depreciation rates are specified by type of capital asset, and the system applies uniformly to all taxable persons, whether the taxpayer is an individual, a corporation, or a trust. Flexibility is built in by allowing

less than the maximum capital cost allowances to be claimed each year.

Accounting depreciation policies (methods and rates) are selected by firms with reference to the basic accounting principles and managements' implicit and explicit financial reporting objectives. The multiplicity of such objectives means that managers exercise considerable discretion in selecting accounting depreciation policies.

The capital cost allowance changes associated with tax reform in 1988 provide a window of opportunity for accounting and tax researchers to link tax changes and accounting depreciation policy choices. Have the capital cost allowance changes influenced subsequent changes in accounting depreciation policy? An investigation of these possibilities is interesting from a public policy viewpoint, because it could identify financial reporting effects of capital cost allowance tax policy decisions. Also, it could identify that a financial reporting variable—accounting depreciation—influences the tax expenditure budget, and therefore, tax revenue collections. A main objective of this study is to uncover information that will assist in making tax policy more effective and less subject to taxpayer manipulation.

This research could also contribute to a theory of accounting method choice. Accounting researchers and policy makers are trying to determine what variables influence management's choice of accounting methods in varying circumstances. While some influences, like the effect of management incentive plans, are direct and, in theory, testable, there are other influences that are particularly difficult to identify. One such influence is political costs, defined as decreases in future cash flows due to regulatory or tax laws. This study reveals that a tax variable is associated with the choice of and changes in accounting depreciation policies.

There have been no major Canadian accounting standard changes in the last fifteen years that directly affect accounting for depreciable assets. However, consistency in

accounting standards for depreciable assets has not deterred firms from making deprecation method changes. The obvious question is "why do firms continue to change their accounting depreciation methods?" In a more general sense this question has been very important in positive accounting research for accounting method choice in the last fifteen years.

The effects of the 1988 changes in the capital cost allowance provisions, changes in accounting depreciation policies and their relationships are examined in this study. In Chapter 2, the positive accounting literature that investigates depreciation accounting policy choice is reviewed. Positive accounting research reveals that there are significant relationships between the choice of depreciation method and a firm's size, leverage, control, and use of management incentive plans. I contribute to this literature by examining the relationship between mandated income tax methods and the selection of accounting depreciation policies and subsequent changes therein.

The adoption of an accounting standard increases the likelihood that a similar standard will be adopted by income tax authorities. This is promoted in current Canadian tax publications as "G.A.A.P. Is In". While the tax laws are not directly bound to financial accounting standards, the indirect relationship in the U.S. is well documented by Zeff (1972) and Moonitz (1974). A 1975 A.I.C.P.A. survey of 225 U.S. firms reported that tax considerations heavily influence the use of accelerated depreciation methods (Lambden, et al.). Thus, in showing which variables influence depreciation choices, I show which variables may influence future tax policy.

The accounting literature review is followed in Chapter 3 by a review of the capital cost allowance literature that examines the interrelationships between capital cost allowance deductions, effective tax rates, and economic characteristics of firms. Unlike the accounting literature, the tax literature is not focussed on accounting policy choice.

In the scope of capital cost allowances, considerable effort has been devoted to identifying the effects of inflation and determining effective tax rates for varying industries.

Chapter 4 presents the research design that empirically tests whether capital cost allowance system changes have influenced depreciation policy choices. The research design expands upon previous studies that examined depreciation method choice. Size, leverage, and capital intensity variables are used to identify patterns of depreciation method choice. The analysis also includes a variable that proxies for tax exposure due to changes in capital cost allowance rates.

The general hypothesis of this paper is that firms with high tax exposure will select income decreasing accounting depreciation policies. The main new undertaking of this study is to examine firms that change their depreciation methods. Do firms that changed their depreciation policies subsequent to tax reform differ significantly from firms that continue to use the same depreciation policies? Also, do firms that change their policies to increase reported income differ from firms that change their policies to decrease reported income? Are the differences between firms associated with differences in their tax exposure? Firms are presumed to have high tax exposure if they have capital cost allowance deductions that exceed accounting depreciation. As a deterrent to the prospect of future tax liabilities, managers of these firms may have changed accounting depreciation policies to increase current accounting depreciation expense which caused reported income to decline.

In Chapter 5, the results of a matched-pair test reveals that there are systematic differences between firms that change their depreciation policies and firms that do not, and between change firms. A multivariate technique, discriminant analysis, is then used to discriminate between the change groups. The discriminant analysis reveals that there are significant differences between these firms, and between firms that select income

increasing changes and firms that select income decreasing changes in depreciation policies. The significant variables include size (total assets and shareholders' equity), leverage (total debt/shareholders' equity), and tax exposure (deferred tax expense), an influential variable that has not been previously identified in the accounting method choice literature.

The general hypothesis that firms with high tax exposure will select income decreasing depreciation policies is supported, and the following conclusions are drawn:

1. Among firms that change accounting depreciation policies, firms that select income decreasing policies differ very significantly (.02 level) from firms that select income increasing policies. The model developed is useful in predicting the direction of the change, resulting in an 8 percent improvement in predictive ability over a naive model. The significant explanatory variables include tax exposure, shareholders' equity, and leverage. The most interesting result is that firms that select income decreasing changes tend to have high tax exposure.
2. Firms that change depreciation policies differ significantly from firms that do not change (.04 level). However, these results are ambiguous because of the diversity of group membership in the change group (includes firms that select income increasing and income decreasing depreciation policies).
3. Firms that select an income decreasing depreciation change or no change differ significantly (.07 level) from firms that select an income increasing change. The continuous variables included in the model are tax exposure and leverage. In common with hypothesis 1, income decreasing or no change firms tend to have high tax exposure.
4. Firms that select an income increasing depreciation change or no change differ significantly (.01 level) from firms that select income decreasing change. While tax exposure is not a significant variable, size and leverage are significant.

The main conclusion is that tax exposure significantly differentiates among firms that select income increasing and income decreasing depreciation method changes. It appears that change firms with high tax exposure attempt to more closely align accounting depreciation expense with capital cost allowance claims. There are two obvious reasons why this could be so. It can be administratively easier if accounting depreciation equals tax depreciation. A more interesting reason could be that firms that select income decreasing depreciation methods do so in an attempt to reduce their tax exposure to future reductions in the capital cost allowance rates.

What do these results mean for the tax policy maker? Despite the insistence of the accounting profession that accounting policies for capital assets should be independent from the determination of capital cost allowances, there appears to be a detectable mutual influence. After tax reform was introduced in 1984, firms that were large, were highly leveraged, and had high deferred tax expense were inclined to change their depreciation policies so that accounting depreciation would be greater and closer to capital cost allowance claims. Firm management appear to choose rapid depreciation schedules in the belief that similar capital cost allowance provisions will follow.

Tax policy makers should be aware of the likelihood that, when CCA rates are reduced, there is an impetus for some firms to select income decreasing accounting depreciation methods so that depreciation expense more closely approximates capital cost allowances. This initiative reduces excess CCA claims, which are an important consideration when CCA tax changes are considered. When excess CCA is reduced, the CCA tax expenditure is reduced, and there is less likelihood that tax authorities will target the CCA system for change. Thus, tax exposure is minimized when income decreasing depreciation changes are made. If changes to the capital cost allowance

system are contemplated, this likelihood should be factored into the CCA system analysis. This paper is interesting in a broader scope, as it shows that firm behavior changes when tax policy changes are made.

Given the apparent influence of capital cost allowance provisions on accounting depreciation policies, accounting policy makers should ensure that the selection of accounting depreciation methods is independent of tax depreciation methods. More effort should be devoted to determining economic depreciation to achieve a better matching of revenues and expenditures. Emphasis should be placed on the different reporting objectives between tax and financial accounting. There is excellent research potential in further examination of the effects of tax exposure variables on accounting method choice and public policy decisions.

Chapter 2—Depreciation and accounting theory

Theory of depreciation

Depreciation is used by virtually all for-profit firms with capital assets. Accounting depreciation is an allocation of the cost of an asset over its useful life in a "systematic and rational" manner. This definition first appeared in the A.I.C.P.A. Accounting Terminology Bulletin No. 1 (Skinner, 1987). The allocation method used is intended to result in the best matching of revenue earned with the costs incurred to earn that revenue, in accordance with the matching principle. In economics, the cost of an asset is irrelevant and depreciation reflects changes in value of an asset from one point in time to another, with the sum of an asset's discounted future services being used to determine value. Economic depreciation relies on value in use and accounting depreciation relies on historical costs, and usually the two are not the same.

The generally accepted set of depreciation accounting methods, within which managers have discretion, include straight-line (SL), declining balance (DB), sum-of-the-years'-digits, and units of production. Under the straight-line method, the cost of an asset, minus its anticipated scrap value, is allocated over its useful life in equal amounts each year. Declining balance is an accelerated method in which depreciation is calculated at a fixed rate of the undepreciated cost of the asset. The sum-of-the-years'-digits method is also an accelerated method that provides for yearly depreciation by reference to a formula based upon the aggregate of the years in the asset's useful life. The units of production method allocates depreciation to each year on the basis of the units produced during that year.

The theory of depreciation has a rich past as evidenced in the accounting and economics literature. Many models for optimizing depreciation policies for different purposes, and varying levels of uncertainty, are included in the economics literature.

The models typically incorporate the time-value of money, rate of asset utilization, level of maintenance, and attempts to lower the present value of tax payments. There have been many efforts to estimate the "true rate" of economic depreciation (Kim and Moore, 1988; Epstein and Denny, 1980; Hulten and Wykoff, 1980). These scientifically modelled rates are not commonly used. Rather, a variety of methods and rates are used for an even greater number of reasons, not the least important of which is pure management discretion. Tax minimization is a popular consideration in depreciation models. In the U.S., where firms can choose between declining balance or straight-line tax depreciation methods, present value models are frequently used to select optimal tax depreciation methods. Numerical simulations and capital budgeting techniques are typically used to derive these models.

The tendency in accounting literature has been to evaluate the relative merits of various depreciation policies, under different profitability circumstances, and under different tax systems. The results of these efforts are inconclusive and the consensus is there is no "true" depreciation method, and all methods used or proposed are mere conventions, the choice between which is a matter of convenience (Wright 1964; Thomas 1969).

Notwithstanding, important accounting research in the last twenty years has found discernible patterns in the selection of depreciation methods by managers. This research can be classified into two types: (1) stock price consequences and (2) predicting choice of accounting methods, each of which is surveyed in this chapter. Literature focusing on the choice of accounting depreciation methods is reviewed.

Stock price consequences

Some early capital markets research investigated the stock market reaction when firms changed their depreciation methods. Archibald (1972) analyzed firms that

changed their depreciation method from a form of accelerated depreciation to straight-line for financial reporting purposes (switch-back), while retaining accelerated depreciation for tax reporting purposes. The changes all occurred subsequent to the passage of the Internal Revenue Code of 1954, which allowed firms to use straight-line or accelerated depreciation methods for tax reporting purposes. The abnormal market price behavior of 69 switch-back firms in the four years surrounding the change was monitored. Archibald concluded that, on average, switch-back firms had below normal stock market performance in the two year period preceding the change. However, the switch-back announcement and resultant profit improvement had no significant immediate effect on stock market performance.

Holthausen (1981) investigated why managers voluntarily change accounting methods. Again, the switch-back to straight-line depreciation methods for financial reporting purposes, but not for tax purposes, was examined. Using a markets expectations model, the daily returns of 120 firms that made the switch-back over the period 1955-78 were examined to determine if there were systematic abnormal returns at the time of the accounting change. There was no indication of abnormal performance of the firms being related to the:

1. effect of the depreciation change on reported earnings,
2. size of the firm,
3. firm's deviation from its dividend constraint, or
4. existence of a profit-based management incentive plan.

Holthausen concluded that debt covenants and management incentive plans, that use accounting numbers, are probably not related to the choice of accounting methods. But, the conclusions are obscured because there is lack of information about specific contractual obligations and by the difficulty in establishing event times. Further, the test is weak because it did not consider other accounting method choices, and the dividend

constraint is used to proxy for all debt covenant restrictions.

The results of Archibald (1972) and Holthausen (1981) are consistent with the efficient markets hypothesis—the market, at the aggregate level, is not fooled by an accounting policy change for the same economic reality providing there is no corresponding cash flow effect. If the newly adopted policy results in changes in income tax liabilities, managers' bonuses, government intervention, or leverage options, there could be a cash flow effect. In Archibald's and Holthausen's studies, the depreciation methods used for income tax purposes remained the same, so there was no direct change in the income tax payable burden. However, there may have been a cash flow effect from the profit-based management incentive plans and debt covenants, but the effect was probably too small to influence the stock prices.

Predicting choice of depreciation method

Watts and Zimmerman's (1978) seminal research into the positive theory of accounting has spawned important accounting research, especially into accounting method choice. Watts and Zimmerman hypothesize that management's support or opposition to a proposed accounting standard depends upon the size of the firm and whether the proposed standard increases or decreases the firm's reported earnings. Large firms will support an accounting standard that will reduce reported earnings because lower reported earnings have benefits in the form of tax, political, and regulatory considerations. Economic consequences result from contractual or causal links between the firms' cash flows and reported accounting numbers for:

1. profit-based management incentive plans,
2. government regulations,
3. lending agreements, and
4. political visibility.

The political visibility link is the most tenuous, as it is rarely substantiated with formal contracts.

Watts and Zimmerman (1978) test the hypothesis empirically by examining all of 53 corporate responses to the solicitation by the Financial Accounting Standards Board (FASB) for comments and positions on its discussion memorandum *Reporting the Effects of General Price Level Changes in Financial Statements* (FASB, 1974). After controlling for the direction of change in earnings, the ranking of the responses revealed that firm size explained over half of the variance in voting behavior.

Watts and Zimmerman (1978) also conclude that current and prospective tax considerations influence a firm's reaction to proposed changes in accounting standards. Managers will favour accounting standards that reduce current taxes payable. Also, prospective tax considerations are important if "management expects a proposed financial accounting procedure to influence future tax laws, (and) their lobbying behavior is affected by the future tax law effects" (p. 115).

The accounting method choice literature most relevant to this paper was prepared by Hagerman and Zmijewski (1979). They tested the theory developed by Watts and Zimmerman (1978) that firms change accounting standards for economic reasons. Firms that are large, risky, capital intensive, or have monopoly rents have incentives to select accounting methods that will reduce reported income due to the greater political exposure they have. On the other hand, if there is a management incentive plan, managers will choose accounting methods that increase reported income to increase their bonuses, and thus, their own wealth. Likewise, if a firm has a large debt load, income increasing accounting methods will be selected to ensure that debt covenants are met.

In the accounting method choice literature, the use of an accelerated depreciation method is assumed to reduce net income relative to what would be reported if straight-line depreciation is used. Declining balance and sum-of-the-years'-digits depreciation methods are treated as an income decreasing choice and straight-line as an income increasing choice (Barefield and Comisky, 1971; Hagerman and Zmijewski, 1979). In theory, declining balance methods should eventually result in reversals so that declining balance depreciation is less than straight-line depreciation. In practice, however, this "reversal" seldom occurs because firms continue to buy new depreciable assets.

Hagerman and Zmijewski (1979) use probit analysis to determine if the accounting methods managers select for depreciation, inventory, investment tax credit, and pension cost amortization are influenced by economic variables. The results for depreciation method choice are the most significant and unambiguous. The choice between straight-line and accelerated depreciation methods is significant at the .05 level for firm size and risk. Capital intensity and the management incentive plan variables are significant at the .10 level, but the concentration ratio is not significant. Overall, the model explains .49 of the variation (R^2) in choice of depreciation methods. For the other accounting principles tested (inventory, pension cost amortization, and investment tax credit), the variation explained is not as significant (.23, .06, and .07, respectively) and the influential variables tended to be different. These inconsistent results beg questions about why managers do not base all of their accounting method decisions on the same economic variables.

In a follow-up study, Zmijewski and Hagerman (1981) hypothesize that managers are unlikely to make accounting policy choices independent of the set of other accounting methods used by the firm. Rather, management will adopt a

multidimensional or portfolio income strategy for the firm and select accounting methods accordingly. Managers will make all income increasing or all income decreasing accounting method choices.

Using the four accounting methods tested in the Hagerman and Zmijewski (1979) study and augmenting the economic variables with a debt/equity ratio, Zmijewski and Hagerman (1981) use *n*-chotomous probit analysis to test the portfolio income-strategy hypothesis. They use three arbitrary income strategies, varying the income direction and relative importance of combinations of accounting methods. For each strategy, the size variable is significant at the .01 level, the concentration ratio and management incentive plan variables are significant at the .05 level, and the debt/asset ratio is significant at the .10 level. The coefficients of the risk and capital intensity variables are not significant. The Zmijewski and Hagerman (1981) results provide evidence that the manager's choice of a portfolio of accounting methods varies with different economic variables, but the variation explained by the models (R^2) is only .09. The portfolio approach yields only marginally better results than the single procedure studies (Watts and Zimmerman, 1990).

Dhaliwal, Salamon and Smith (1982) added to the depreciation method choice research by investigating whether owner-controlled and manager-controlled firms use different depreciation methods for financial reporting purposes. "Firms were classified as owner-controlled if one party owned 10 percent or more of the voting stock and exercised active control, or if one party owned 20 percent or more of the voting stock" (p. 48). Using probit analysis, and controlling for firm size and leverage, they conclude that firm control is significant at the .01 level in the choice of straight-line or accelerated depreciation methods. Owner-controlled firms tend to select accelerated depreciation

methods, and manager-controlled firms select straight-line methods. However, their definition of control is arbitrary and there is no sensitivity analysis of the definition of owner versus manager control.

Consistent results among the studies reveal systematic relationships between accounting method choice and some economic variables. Table 1 reports significant t-statistics for the influential economic variables in the most relevant depreciation method choice studies.

Table 1
t-Test results for influential economic variables in depreciation method choice studies

	Voting behavior	Single procedures	Portfolio	Firm control
Economic variables	Watts & Zimmerman (1978)[a]	Hagerman & Zmijewski (1979)	Zmijewski & Hagerman (1981)	Dhaliwal, Salamon, and Smith (1982)
Size				
Assets		-2.162		-1.054
Revenue	3.67		-2.720	
Sales change	-1.11			
Management incentive plan	-1.42	1.773	2.112	
Concentration /regulated industry	-1.29	-.919	-2.193	
Risk		-2.409	-0.518	
Capital intensity		1.923	-0.945	
Debt/equity			2.005	2.939
Firm control				1.860
Net monetary assets	-1.62			
Depreciation	.60			
R^2	.358	.486	.091[b]	n/a
Chi-square	9.25	16.944	26.581	13.2589

[a] Discriminant analysis t-statistics are reported for independent variables even though they are not asymptotic. The dependent variables are not normally distributed and the sample size of 49 is small.

[b] The R^2 reported is for the portfolio model in which a consistent income strategy is selected for depreciation, inventory, pension costs, and investment tax credit accounting methods.

A size variable is very significant in all four of the cited studies, and the management incentive plan and concentration variables are significant in three studies. Risk, capital intensity, and debt/equity are significant in two of the studies.

There is an accumulating body of evidence consistent with the positive theory for accounting method choice. Firm size, the existence of management incentive plans, debt/equity ratios, capital intensity, owner/manager control, risk, and competition are related to accounting method choice in significant ways, as demonstrated in the studies referenced. While all of the studies were published between 1978 and 1982, subsequent development of the theory is minimal.

For the positive accounting research cited, criticisms address the variables used, omitted variables, the tests' lack of power, and use of the term "positive" in the title. Even though the positive accounting literature reveals that there is a relationship between certain economic variables and accounting method choice, the explanatory power of the tests is low, with .49 being the highest variation explained. Most tests, however, have lower explanatory value. Naturally, questions arise about the appropriateness of the variables used leading to conjectures about variables that are omitted, but which should be included. This paper attempts to take a small step along this road of discovery by analyzing whether tax exposure is an influential variable.

Accounting method choice hypotheses

The depreciation studies cited and other accounting method choice studies have led to the development of three hypotheses of accounting method choice:

> *Size hypothesis* - Managers of larger firms will choose accounting methods that reduce current period earnings.
>
> *Debt/equity hypothesis* - The larger a firm's debt/equity ratio, the more likely management is to select accounting methods that increase current period earnings.

Bonus plan hypothesis - Managers of firms with earnings-based bonus plans will choose accounting methods that increase current period earnings.

Watts and Zimmerman explain these hypotheses and summarize the related studies in their book *Positive Accounting Theory* (1986).

Of the three hypotheses, the bonus plan hypothesis has received the least criticism. Testing of the bonus plan hypothesis is the easiest for data collection and dichotomous dependent variable tests, as long as disclosure is required by regulatory authorities as it is in the U.S. Healy (1985) carefully showed that the existence of an earnings-based management incentive plan affects accounting method choice, and the results are unchallenged. The debt/equity hypothesis has been questioned mainly because the existence of restrictive covenants and nearness or encroachments on debt covenants are seldom considered. Press and Weintrop (1990) investigated the relation between leverage and the accounting-based constraints in debt agreements. They report that the presence of a leverage constraint is associated with income-increasing accounting choices.

The size hypothesis has received most of the criticism, because the political cost effect is unclear. Total assets and total revenue are typically used as size variables that proxy for political visibility of a firm, but little is known about their use in this context. Unlike the bonus and debt/equity hypotheses, which depend on established contracts, the linkage between political visibility and accounting numbers is tentative as it does not depend on explicit contracts. Instead, the link results from the potential use of the firm's accounting numbers by parties usually considered external to the firm.

Proponents of the size hypothesis argue that size affects the extent to which a firm is criticized or supported by consumers, employees, unions, politicians, and bureaucrats. No studies have proven a direct link between size and political visibility (Holthausen and Leftwich, 1983; Leftwich, 1990). Leftwich claims that the "size hypothesis is simply

another name for the observed statistical associations." More importantly, we should be "concerned with *why* large and small firms choose different techniques and few studies...shed light on that question" (p. 42). Regardless, because of the significance of size variables in accounting method choice studies, total assets and total revenue continue to be widely used as proxies for political visibility.

A more direct measure of political sensitivity than firm size is needed. The size hypothesis would be richer if the costs and benefits of political visibility were identified and analyzed. While there are many other political influences (e.g., threat of regulation, union demands, and market share competition), taxes and government assistance programs are a substantial political cost or benefit that many corporations experience. Typically, about one half of Canadian corporations are taxable in any one fiscal year.

The development of the size hypothesis should be aided by an analysis of the implicit and explicit taxes that firms bear. While this analysis could take many forms, an interesting research project would be a study of the association between tax burden and firm-specific factors, such as size. Another possibility is time series analysis of related tax and accounting changes that could provide evidence of any convergence between the two. For example, a model could compare changes in accounting and tax depreciation rates, to determine if there are systematic change patterns.

Research on corporate tax effects on firms is limited, but two groups of studies are emerging. The first group examines differences in effective tax rates across industries. A second group of studies focuses on the neutrality of the corporate tax system with respect to particular characteristics of firms. These studies will be summarized in the next chapter, which surveys the relationship between depreciation methods selected for accounting and capital cost allowance which is regulated for income tax purposes in Canada.

Chapter 3—Depreciation and taxation

Capital cost allowance (CCA) system

Depreciation expense is deducted in the calculation of accounting net income, but it is not allowed as a deduction for income tax purposes in Canada. The *Income Tax Act* provides for a capital cost allowance system in lieu of financial statement depreciation of fixed assets. Under the capital cost allowance system, deductions are allowed in calculating taxable income based on specified rates of write-off of the historic cost of assets. The rates are linked arbitrarily to the depreciation of physical assets, and they are subject to manipulation by taxation authorities and politicians. In comparison to accounting depreciation rates, the capital cost allowance rates have traditionally been generous, as noted by some economists (Brown, 1986; Boadway et al., 1982). The maximum allowable rates for claiming capital cost allowances are set by the Department of Finance, but firms have discretion to deduct lesser amounts in calculating taxable income.

Notwithstanding the generous nature of the capital cost allowance rates, the system has been widely criticized because it does not take into account the current or replacement cost of assets. In addition, the system does not allow for the imputed rent or foregone interest because equity funds (as opposed to debt) are invested in depreciable assets. This can result in capital intensive firms appearing to earn higher profits than labour intensive firms as the total cost of equity capital is not a recognized expense in computing net income (Thirsk and Whalley, 1982; Zmijewski and Hagerman, 1981; Boadway, et al., 1980). These problems are particularly pronounced in periods of rapid inflation. For most firms, however, the generous capital cost allowance rates more than offset the lack of replacement cost depreciation (Boadway, et al., 1987; Department

of Finance, *A direction for change,* May 1985; Brown, 1985; Jenkins, 1985; Smith, 1979). Also, accelerated capital cost allowance incentives have been justified to offset the opportunity costs of capital intensive firms.

It is useful to summarize important capital cost allowance system developments in Canada. Before 1949, depreciation allowances for tax purposes were usually based on the straight-line method. In 1949, the tax depreciation system changed to the declining balance method and the capital cost allowance rates for most depreciable assets were set at twice the old straight-line rates (Skinner, 1972). For example, if the "old" capital cost allowance rate allowed was 10 percent straight-line, the "new" declining balance rate was set at 20 percent. A "booking requirement" ensured that the aggregate allowance claimed by taxpayers would not exceed the total depreciation shown in the financial statements. Many corporations used the capital cost allowance method and rates to calculate accounting depreciation to maximize their tax depreciation deduction. The requirement for conformity between accounting depreciation and capital cost allowance superceded the fundamental accounting principle of "matching" of revenue earned with costs incurred. Accounting depreciation was not prescribed—rather, firms could, and still can, select the methods and rates to best suit their business. Pressure by taxpayers and accounting regulators resulted in the "booking" requirement being repealed in 1954.

The Carter Commission reviewed the income tax system and reported in 1966 that the capital cost allowance system was fair and sound, and it was easy to understand and comply with. While the Commission concluded that the capital cost allowance system was somewhat arbitrary, it operated satisfactorily. No changes to the system were recommended except that there should be no deduction allowed until an asset has been put in use (*Royal Commission on Taxation,* Vols. 2 and 4, 1966). The subsequent 1972 tax reform made no substantial changes to the capital cost allowance system

except to introduce a two-year fast write-off for manufacturing and processing equipment. At that time, growth of manufacturing and processing industries was considered to be of strategic importance. A half-year convention was introduced in 1981, so that in the year of acquisition of depreciable assets only one-half of the capital cost allowance otherwise claimable is allowed.

A special survey of the depreciation practices of almost 60 percent of Canadian corporations was undertaken by the Department of Finance from 1973 to 1976. The results of the survey were published in May 25, 1976 federal budget as *Budget Paper C: Capital Cost Allowances* (subsequently referred to as "1976 CCA Survey"). Information from 1,283 large and 2,121 small corporations was collected on the financial depreciation policies used, the objectives of accounting depreciation, the relationship of capital cost allowances to accounting depreciation, and the comparison of net book value for accounting to undepreciated capital cost for income tax purposes. Corporations that were eligible for the small business deduction are classified as small, with all others are classed as large.

The methods of depreciation used by surveyed firms are reported in Table 2. The most frequently used depreciation methods were straight-line for large firms (44%) and declining balance, with CCA rates, for small firms (64%). In total, straight-line and declining balance, with capital cost allowance rates, methods were used by 28 percent and 32 percent of the firms, respectively.

When management of firms was asked how frequently they reviewed their accounting depreciation policies, 29 percent replied each year, 10 percent replied every 2-5 years, and 40 percent replied irregularly.

Table 2

Depreciation methods used by corporations

Depreciation method	Number of corporations: Large	Small
Corporations using only one method		
Straight-line	378	49
Declining balance, with CCA rates	59	416
Declining balance, with other rates	19	41
Production	12	4
Other	2	0
Sub-total	470	510
Corporations using several methods	390	136
Total	860	646

Source: Department of Finance, *Budget paper C: Capital cost allowances,* May 25, 1976 p. 8.

For small and large corporations, alike, the stated major objective of accounting depreciation was the general matching of capital costs against revenues. But, an analysis of Table 3 shows that more small corporations (39%) than large corporations (7%) used capital cost allowance rates, probably as a matter of convenience.

Table 3

Objectives of accounting depreciation

Objectives of depreciation	Large corporations	Small corporations
Match costs against revenue based on useful life	654	228
Match CCA claimed	55	164
Consistent annual measurement	32	24
Other	35	4
Total	776	420

Source: Department of Finance, *Budget paper C: Capital cost allowances,* May 25, 1976 p. 10.

In a comprehensive U.S. survey of depreciation methods used by firms, respondents ranked matching as the principal reason for selecting straight-line methods, but matching was seventh as a reason for choosing accelerated methods. Also, among surveyed U.S. firms, tax considerations "heavily influenced" the use of accelerated depreciation methods (Lambden, et al., 1975).

The classification of depreciable assets was also examined to assess whether capital cost allowance rates appropriately reflect the useful lives of the assets. The 1976 CCA Survey concluded that the capital cost allowance system was "basically" sound in providing a declining balance method of depreciation allowances with a small number of classes. However, some capital cost allowance methods and rates provide a significantly faster write-off of the capital cost of depreciable assets than does depreciation recorded for financial accounting purposes. In this survey, "financial depreciation is...the most readily available indicator of useful lives" (1976 CCA Survey, p. 11). "The financial depreciation recorded in financial statements...is taken as the best available proxy for economic depreciation" (*Ibid*, p. 18). This is consistent with most other studies of depreciation in which accounting depreciation is used as a reasonable proxy for "true economic depreciation" (Kwon, 1978).

In a recent reform of the Canadian income tax system, the 1976 CCA Survey was used to rationalize decreases in certain capital cost allowance deductions. The May 1985 budget document, *A direction for change*, set the stage for reform of the corporate income tax system, including reductions in the accelerated write-offs of depreciable assets. The rationale provided for the reductions was that by claiming accelerated capital cost allowance, excess deductions had become like tax exemptions.

> "Frequently, CCA deductions are faster than the depreciation expenses deducted on the financial statements. Faster write-offs are one way in which incentives can be given to investment. While, strictly speaking, a fast write-off provides a tax deferral, such deferrals can be valuable to a firm particularly if

> they are for long periods of time. As well, if the firm continues investing, the deferral can be indefinite and thus tantamount to a complete exemption." (Department of Finance, *A direction for change*, May 1985, p. 5)

Tax exemptions are usually permanent in nature, and therefore are more beneficial to taxpayers than timing differences, which reverse over time. The fast write-offs of depreciable assets were deemed not to be achieving the desired economic results and were perceived to distort investment decisions of taxpayers. Low marginal tax rates were observed in the case of investments in manufacturing and construction equipment, both of which were eligible for accelerated depreciation and the investment credit. (Salyzyn, 1986; Daly, et al., 1985; Boadway, et al., 1980). This caused "major inter-sectoral differences in marginal tax rates" (Department of Finance, *A direction for change*, May 1985, p. 15). To neutralize the economic distortions, the 1985 budget proposed a broadening of the tax base to include substantial reductions in some capital cost allowance rates and a "put-in-use" rule was introduced. This rule means that capital cost allowance can only be claimed on an asset commencing in the year it is placed into service. Also, corporate tax rate reductions were proposed to promote revenue neutrality.

The 1985 budget proposals for capital cost allowance reform referenced the fundamental accounting principle of "matching" and accounting depreciation practices as the basis for reductions in capital cost allowance deductions. An overview of the new strategic direction was proposed so that the "matching of income and expenses could be accomplished in a number of ways, including narrowing the difference between capital cost allowance rates and financial statement depreciation rates, [and] delaying the taking of depreciation until income is earned" (Department of Finance, *A direction for change*, May 1985, p. 42). This was a new endeavor for the Department of Finance, revealing to taxpayers that accounting depreciation policies are considered in the setting of capital cost allowance rates.

The 1985 proposals were formalized in the June 1987 White Paper on tax reform, and the new strategy was communicated clearly in the following extracts from the White Paper.

> "Building depreciation claimed by corporations on their financial statements is often significantly lower than is now permitted for tax purposes... The reduced CCA rate for these assets will be more in line with actual depreciation."
> (Department of Finance, *Tax reform 1987: Income tax reform,* June 18, 1987, p. 107)

> Similarly, for power-operated, movable earth-moving equipment, the existing "rate exceeds the economic depreciation of these assets, although, depending on use, actual depreciation can vary widely. The proposed reduction in CCA rate for these assets is generally intended to ensure rates that are more in line with average depreciation experience."
> (*Ibid,* p. 105).

> Likewise, the "put-in-use rule will ensure better matching of income and expenses and is consistent with accounting rules for depreciation on financial statements."
> (*Ibid,* p. 108).

Reductions in accelerated rates were rationalized because capital cost allowance rates usually exceeded the accounting depreciation for certain assets and there was an inequitable distribution of tax incentives among the various classes of assets. The fiscal objective was to reduce these distortions by reducing accelerated capital cost allowance rates as summarized in Table 4. As a general rule, assets remain in their old class if they were acquired before 1988.

The capital cost allowance changes were introduced along with tax rate reductions, which neutralized most of the effects of the CCA changes. Opposition was also deflected by the comprehensiveness of reform, particularly of the personal and sales tax systems. Criticism of the sales tax reform has been the loudest and most persistent.

Table 4

Major changes in CCA rates from tax reform

Classes of assets	Pre-1988 CCA rates		Post-1987 CCA rates	
Buildings	5%	DB	4%	DB
Certified Canadian films	100%	DB	30%	DB
Earth-moving equipment	50%	DB	30%	DB
Manufacturing machinery and equipment	50%	SL	25%	DB
Outdoor advertising signs	35%	DB	20%	DB
Public utility property	6%	DB	4%	DB
Resource extraction assets	30%	DB	25%	DB

Source: Department of Finance, *Tax reform 1987: Income tax reform,* June 18, 1987, p. 102.

There was a surprising lack of opposition to the proposed changes to the capital cost allowance system. This was acknowledged by the Department of Finance in a supplementary information release on December 16, 1987.

> "The *White Paper* proposals for changes to these CCA provisions were not a major issue of discussion during the consultative process. There was broad recognition that, with the proposed tax rate reductions, base broadening should include a reduction in the accelerated write-offs of the depreciable assets identified." (p. 66)

The tax reform package was finally enacted as Bill C-139 on September 13, 1988, with the capital cost allowance changes being the same as proposed in the June 18, 1987 White Paper.

The 1976 CCA Survey, the 1985 federal budget proposal, and the 1987 *White Paper* on tax reform all confirmed that accounting depreciation provisions are tracked

and monitored by the Department of Finance. The documents highlight that, prior to 1984, some capital cost allowance provisions exceeded accounting depreciation, and this information was used to justify reductions in most of the accelerated capital cost allowance rates.

The existing capital cost allowance system still provides a somewhat accelerated tax write-off compared to the economic depreciation in the value of an asset over time due to wear and tear, obsolescence, and declining productivity (Brown, 1989; Richardson, 1989; Department of Finance, *A direction for change*, May 1985; Department of Finance, *Account of the cost of selective tax measures,* August 1985). The excess is allowed to retain some "incentive effects" (Department of Finance, *Income tax reform,* June 18, 1987) and, presumably, to offset the effects of inflation.

While the concept of "economic depreciation" is often referred to, there appear to be few attempts in recent Canadian tax literature to articulate how economic depreciation provisions relate to accounting or tax depreciation provisions. In discussing the capital maintenance concept of income, Bossons (1977) acknowledged that ideal depreciation for a capital good should

> "measure the change in its real economic value... (However,) from a practical viewpoint, it is not feasible to calculate the change in value of an asset which is either infrequently or (in some cases) never traded, and because such assessments of value would in any case be subjective... [T]he conventional accounting approach serves roughly to approximate an economic definition of the rate of depreciation, particularly when aggregated over all fixed assets owned by a company." (pp. 63-65)

To account for inflation, Bossons simply adjusted accounting depreciation by a ratio of average current acquisition costs to the historic acquisition costs for capital goods.

Jenkins (1977) used a similar approach to calculate economic depreciation in identifying the financial impact of inflation on business in Canada. In the period from 1965-1977, Jenkins showed that the ratio of estimated capital cost allowance at current

replacement prices to the actual capital cost allowance at historical cost for manufacturing capital goods averaged 1.39 per year. He calculated that "the amount of economic replacement cost depreciation expense was less than the actual tax depreciation expense claimed for almost all years from 1965-1974" (p. 8). He concluded that "liberal depreciation rules have more than compensated for the deterioration in the real value of the capital cost allowance brought about by inflation" (p. 11).

The declining balance depreciation method used for capital cost allowance is also beneficial because reversals of excess capital cost allowance over accounting depreciation seldom occur. In making the case for accelerated depreciation, Domar (1953) argued that accelerated depreciation not only "results in a postponement of tax payments, an interest free loan which must sooner or later be repaid", but capital investment in a "growing stream—the most realistic American case—will result in a permanent reduction in the effective tax rate" (p. 494). In a study of 100 major U.S. corporations' financial reports, Price Waterhouse concluded that only 2 percent of recorded deferred taxes relating to depreciation and instalment sales reversed over a twelve-year period from 1954 to 1965 (Chaney and Jeter, 1989).

The provincial and federal revenues foregone owing to the excess of capital cost allowance claims over accounting depreciation are substantial. In 1980 and 1983, the federal tax value of incentive capital cost allowances was $2,280 and $714 million, respectively (Department of Finance, *Tax reform 1987: Income tax reform,* June 18, 1987, p. 11). The tax value refers to the tax savings due to excess capital cost allowance claims. The base broadening measures affecting the capital cost allowance system are projected to raise corporate taxes by $740 million in 1990, and they are expected to eliminate most of the excess capital cost allowance claims over accounting depreciation that many firms have become accustomed to (*Ibid,* p. 67).

Not only have tax depreciation rates been reduced in Canada, similar reforms have occurred in the U.S. and Britain. In 1984, the U.S. Treasury published proposals for a major overhaul of the U.S. tax system. The resulting 1986 U.S. tax reform included broadening of the tax base by limiting depreciation deductions and reducing corporate tax rates. The reductions for fast write-offs of depreciable assets were justified as an attempt to better reflect the economic depreciation of assets. Also, in 1984, Britain announced corporate tax changes to reduce the fast write-offs of capital goods, especially on buildings and equipment. The British reductions were much more radical than the Canadian reductions, with, for example, the rate on buildings reduced from 75 to 4 percent (Department of Finance, *A direction for change*, May 1985, pp. 28-29).

Empirical studies

There is little empirical research analyzing the effects of Canadian depreciation practices on the capital cost allowance system, and vice versa. Most of the literature does not link accounting practices and their income tax effects. Rather, it tends to project the economic effects of investment incentives. For example, a widely-cited Daly, et al. (1985) simulation examines the pattern of effective tax rates on income from new investment undertaken by 20 Canadian manufacturing industries. Tax rates for several types of assets were computed, and the methods of financing and kinds of investors were identified using a series of hypothetical marginal investment projects. The conclusion was that "[t]he wide dispersion in effective marginal corporate tax rates...across and within industries can be largely attributed to the accelerated depreciation allowances for machinery and to the investment tax credit" (p. 1155). In the Daly study, accounting depreciation practices were not considered.

Berg and Moore (1988) focus on developing a framework to choose a depreciation method for tax purposes when future cash flows are uncertain. Kim and Moore (1988) estimate a model of economic depreciation consistent with producers' optimization and

conclude that "it is about half of that used according to tax depreciation" p. 111. None of these studies distinguish between depreciation for tax purposes and depreciation for financial reporting (accounting) purposes.

The legal literature is also not very relevant as it emphasizes legal disputes over, for example, the specification of cost, date of acquisition, ownership of assets, and correct classification of amounts.

The lack of rigorous research relating tax and accounting is probably due to disinterest and methodological problems in undertaking the research. First, because accounting depreciation does not enter into the calculation of annual taxable income, accounting depreciation is presumed to have no effect (whether direct or indirect) on income tax liabilities. Research enthusiasm is limited where there are no obvious economic consequences (i.e., cash flow effects). Second, the research is multi-disciplinary involving accounting, economics, and law. Third, the tax regime changes frequently and data tends to be a perpetually moving target—interesting, but hard to pin down. Fourth, Canada's open economy is sensitive to the U.S. tax code, making it difficult to isolate domestic and international effects on accounting depreciation practices.

To the extent that the U.S. and Canadian tax regimes are similar, a review of U.S. research is relevant. Both systems tend to use fast write-offs to achieve economic objectives. The Canadian system uses, almost exclusively, the declining balance depreciation method, whereas the U.S. system allows straight-line, declining balance, and elected alternative methods.

At least two studies have examined the association between effective tax rates and firm characteristics of size, capital intensity, and industry membership. Stickney and McGee (1982) examined financial statement data for 1,097 U.S. firms for 1978 and

1980. Using cluster analysis, the study showed that firms with the lowest effective tax rates tend to be highly leveraged, heavily capital intensive, and are involved in natural resource industries. Foreign involvement and size do not appear to be influential in explaining differences in effective tax rates.

Zimmerman (1983) examined the association between firm size, industry classification, and effective tax rates for 2,000 of the largest U.S. firms over 35 years, 1947-1981. The estimated time series of tax rates from financial statements and IRS tax returns were compared cross-sectionally by both industry and firm size. Among the sample firms, tax rates were only different for the largest fifty firms, indicating there is a threshold effect. The oil and gas industry had the strongest direct relationship between firm size and tax rates, and a strong relationship was also observed in the manufacturing industry. The results are generally consistent with the size hypothesis, supporting the positive accounting research that uses firm size as a proxy for political costs.

The Zimmerman (1983) results, however, contradict the Stickney and McGee (1982) results in two respects. Stickney and McGee conclude that size is not significant and natural resource industries have the lowest effective tax rates. In Zimmerman, there is a strong size effect that apparently is related to membership in the oil and gas industry. The contradictions probably result because of differences in the independent variables used, the time span of the data, and differences in the rigor of the statistical tests. Stickney and McGee's analysis uses capital intensity and leverage, in addition to firm size and industry classification variables that were used by Zimmerman, thus resulting in richer data. However, Stickney and McGee examine only two years and Zimmerman spans 35 years. Also, Stickney and McGee's analysis is weak because they use cluster analysis, a data reduction technique.

These two studies appear to be the only income tax studies that relate directly to the positive accounting literature. The studies report that there is a strong statistical association between the dependent variable—effective tax rate—and the independent variables—capital intensity, leverage, firm size, and industry classification. An interesting question that crosses the two fields of studies is: Does the effective tax rate affect depreciation method choice? Taking this question further, do the actual tax rate and tax deferrals available influence choice of accounting depreciation policy? The tax deferral issue, as it relates to excess capital cost allowance claimed over accounting depreciation, will be examined in this paper.

Importance of G.A.A.P. to tax reporting

One of the traditional debates between accounting and tax policy focuses on whether generally accepted accounting principles (G.A.A.P.) should be used for tax reporting (Harris, 1988; Arnold, 1981; Kahn, 1979). In the absence of specific provisions in the *Income Tax Act*, G.A.A.P. is usually required. For depreciable assets, there are many specific provisions that override the use of G.A.A.P. Nonetheless, G.A.A.P. is the primary determinant in tax expenditure accounting. Tax expenditures are special tax provisions that forego tax revenue to achieve certain economic or social objectives. G.A.A.P. has been used to influence capital cost allowance policy change, and it is referred to as an important justification for recent tax policy changes.

Should the capital cost allowance methods and rates be similar to accounting depreciation provisions? Several authors argue that the objectives of financial reporting and tax reporting are sufficiently different; thus, there is no need for consistency between the two systems (Anderson, 1987; Arnold, 1981; Cronkwright, 1981; Lambden, et al., 1975). This view was articulated in the U.S. Thor Power Tool Co. decision when the

judge concluded that "given this diversity, even contrariety, of objectives, any presumptive equivalency between tax and financial accounting would be unacceptable" (as quoted in Arnold, 1981).

Accounting is a means of communicating summarized financial information to stakeholders of firms to assist in decision-making. The objectives of financial reporting include cash flow prediction, stewardship reporting, evaluation of management, internal control, provision of special purpose reports, and income taxation (Rosen and Granof, 1980). These objectives have led to the adoption of the fundamental accounting principles of matching, consistency, and historical cost, along with the conservatism and materiality constraints.

On the other hand, the objectives of the income tax system are to produce a reasonably balanced and stable source of government revenue that is equitably distributed among the various segments of society and to ensure that resources are allocated in an efficient manner. The conservatism constraint for revenue reporting in financial accounting, for example, is in direct conflict with the income tax objective. All other objectives can, and do, conflict with the income tax objective to raise government revenue. Differences in overall objectives raise an obvious question about the validity of further reliance on G.A.A.P. for tax reporting purposes.

The general consensus among accountants and economists is that G.A.A.P. should not prejudice tax policy. However, some consistency between financial and tax reporting is required to minimize information production costs and compliance costs for taxpayers. Also, consistency reduces initial assessment and audit costs for taxation authorities, as independent auditors are relied upon, and consistency makes tax policy-making easier. For these reasons, minimal statutory departures from G.A.A.P. were advocated by the Royal Commission on Taxation.

Capital cost allowance policy changes

The trend to align capital cost allowance rates with depreciation rates is but one area in which tax and financial accounting policies are becoming more alike. Some other common areas include reporting for leases, revenue recognition, and capital gains on disposals of capital property. This trend is likely to continue, as suggested by the Minister of Finance in the May 1985 federal budget speech:

> [T]here are a number of other areas where there are significant timing differences between taxable income and income as reported in financial statements. These could be examined with respect to the possibility of achieving further evening out of the tax burden across sectors, and of permitting even larger reductions in the overall corporate tax rate.

The changes to the Canadian capital cost allowance system from 1985 to 1988 are linked directly to accounting practices for depreciation. Although there was an indirect linkage in previous years, it has not been prescribed since 1954. The change in tax policy, to bring capital cost allowance rates more in line with economic depreciation rates at the aggregate level (as proxied by accounting depreciation), is an important signal to firms that G.A.A.P. will continue to play an important role in tax policy formulation for depreciable assets.

The Department of Finance will continue to monitor the excesses of capital cost allowance claims over accounting depreciation recorded as part of total government expenditure accounting. The tax expenditure budget, in particular, has become a powerful political tool to focus attention on possible revenue sources. Government officials can easily rationalize reductions in accelerated capital cost allowance rates by pointing to the substantial excess of capital cost allowances claimed over accounting depreciation.

Taxpayers have an incentive to increase their current accounting depreciation expense to reduce the excess of capital cost allowance claims over accounting depreciation, and thus reduce the exposure to further reductions in capital cost allowance rates and increases in tax liabilities. This can be accomplished by adopting accounting methods that increase current depreciation expense and decrease reported accounting income.

A firm's managers might not be motivated to change individual firm accounting policies, since tax policy is set at the national level by the Department of Finance. Management could reasonably assume that the effect of any individual action taken will be miniscule and thus, will not be influential in tax policy formulation. On the other hand, Canada has a relatively small business network, and therefore individual actions may count. This study asserts that individual firms can significantly influence tax policy through their choice of financial reporting methods. Managers may influence tax policy through their influence on other firms in their industry and business community. Further, firms can organize into small but effective special interest groups to lobby the government to maintain the status quo, or, better yet, to reinstate accelerated capital cost allowance rates. The power of special interest groups to influence tax policy has substantially increased in the past two decades.[1]

Hypotheses

My argument is that firms with high tax exposure will adopt income decreasing depreciation methods to minimize their exposure, and the exposure of other firms, to prospective changes in capital cost allowance tax policy. The exposure is reduced because the difference between accounting depreciation expense and capital cost

---

1 Refer to the extensive literature on the influence of special interest groups on public policy: Gillies, 1988; McQuaig, 1987; Sawatsky, 1987; Pross, 1986; Thorburn, 1985.

allowance claims (excess CCA) will be smaller overall, and non-existent for some firms. An increase in accounting depreciation is deemed to have occurred if a firm changes from straight-line to declining balance or sum-of-the-years'-digits depreciation, or shortens the time period over which an asset is depreciated. Depending on the age of the firm's capital asset base, these changes will not always result in an increase in accounting depreciation, but an increase will generally result (Zmijewski and Hagerman, 1981; Hagerman and Zmijewski, 1979; Barefield and Comisky, 1971).

To provide evidence for this argument, a sample of 255 Canadian firms is surveyed to determine if each firm changed the method by which accounting depreciation is determined or if the firm substantially changed the rates used to calculate accounting depreciation. The survey data is collected from annual reports issued prior to tax reform announcements in 1985, and subsequent to implementation of tax reform in 1988.

Firms that changed depreciation methods are compared to firms that did not. Among firms that did change depreciation methods, firms that select income decreasing depreciation methods are contrasted with firms that select income increasing methods.

Accordingly, ceteris paribus, the following null hypotheses are proposed:

H1: Among firms that change accounting depreciation methods, firms that select income decreasing methods will have the same tax exposure as firms that select income increasing methods.

H2: Firms that change accounting depreciation methods will have the same tax exposure as firms that do not change accounting depreciation methods.

Testing of the above hypotheses should reveal whether firms that change depreciation policies are significantly different from firms that do not. The following hypotheses are combinations of hypotheses 1 and 2, resulting in a modest delineation of the firm groupings.

H3: Firms that do not change accounting depreciation methods or select income decreasing depreciation change have the same tax exposure as firms that select income increasing depreciation changes.

H4: Firms that select income decreasing depreciation changes have the same tax exposure as firms that do not change depreciation methods or firms that select income increasing depreciation changes.

In addition to tax exposure, other economic variables may influence a firm's choice of depreciation methods. These variables include firm size, capital intensity, and leverage, each of which will be included in the tests of the hypotheses. The rationale for the choice of these variables is developed in the next chapter.

Chapter 4—Research Design

This chapter outlines the statistical research design for the empirical analysis of Canadian firms that have changed their depreciation methods, to determine if the changes may have been influenced by recent reform of the capital cost allowance system. A description of the variables that are used in the tests, along with a rationale for the measure of the income tax exposure variable follows. The source of the sample data is explained, and for the variables used, summary information and univariate statistics are presented. Finally, the methods to be used to test the hypothesis will be outlined. The results and analysis of the empirical tests are presented in Chapter 5.

Methods

Discriminant analysis, a multivariate technique, is used to determine if tax depreciation exposure is associated with changes in accounting depreciation methods subsequent to the announcement of tax reform in 1985. The main purpose of discriminant analysis is to predict group membership (e.g., change or no change firms) based on a variety of predictor variables. The discriminant functions provide the best combination of variables to maximize differences between groups, and the analysis includes a test for the significance of the classification. Throughout the analysis, emphasis is placed on the tax exposure variable, but other economic variables are used to validate the sample and the tests, and to check for correlation with the tax exposure variable. The next section includes a brief description of discriminant analysis.

To provide corroborative evidence for each discriminant function, the results of logistic regression for the dependent groupings is provided in Appendix 9. Logistic regression is a modification of ordinary least squares regression to make it appropriate for dichotomous dependent variables (e.g., change and no change firms, or SL and DB

firms). However, discriminant analysis results in a better classification procedure (Afifi and Clark, 1984). A comparative analysis of the discriminant functions results and the logistic regression functions leads to the same general conclusions.

A Wilcoxon matched-pair signed-ranks test is also used to determine if change firms are significantly different, based on direction of change, and if change firms differ from no change firms. This test utilizes information about the direction and the relative magnitude of the differences between matched-pairs (Siegel, 1956).

Description of discriminant analysis

Discriminant analysis is used to contrast different firm groupings (scenarios) based on depreciation method changes in the sample period. The analysis determines whether independent variables can be used to discriminate between groups (usually based on categorical variables). If there is a significant discriminant function, the analysis determines which variables are significant and the most efficient way of discriminating between the groups. Discriminant analysis reduces the variables to a single one that is a composite of all variables in the model. The model is chosen so that the discriminant function scores for each group are as far apart as possible. The Wilks' lambda statistic examines whether the groups are statistically different by determining the between-groups dispersion.

The most important summary statistic reported in discriminant analysis is the canonical correlation, which measures the correlation between corresponding pairs of canonical variables. The latter are determined by maximizing the correlation between the linear combinations of variables and the dependent variable. The canonical correlation measures how much of the variation in the dependent variable is explained by the independent variables. Related Chi-square measures and their significance are reported.

One way to use discriminant analysis as a classification technique is to employ the maximum likelihood criterion. For each dual analysis, two likelihood functions are produced in the form:

$$C_j = c_{j0} + c_{j1}Y_1 + c_{j2}Y_2 + \ldots + c_{jp}Y_p$$

where,

C is the score for the likelihood classification function,

j is the discriminant group number (0 or 1),

c is the classification coefficient,

Y is the discriminating (independent) variable, and

p is the number of independent variables.

A score on the classification function for group *j* (C_j) is found by multiplying the raw score on each independent firm variable (Y) by its associated classification function coefficient (c_j). These products are summed over all independent variables and are added to a constant, c_{j0}. A firm is classified into the group that produces the highest likelihood classification score. This classification function is typically referred to as the maximum likelihood criterion. The procedures are slightly modified when there are unequal sample sizes to reflect the *a priori* inequalities (Tabachnick, et al., 1983), a process used in this paper.

Selection of dependent variables

The primary dependent variable is whether or not firms changed their depreciation methods and/or rates in the study period, and this is represented by the variable CHANGE. If a firm changed its methods or rates, the accounting net income effect is analyzed to determine if it was income decreasing or income increasing. Changes to

straight-line depreciation from declining balance or sum-of-the-years'-digits, an increase in rates, and a reduction of the time period over which assets are depreciated, are classified to be income decreasing changes, and vice versa.

A CHANGE of:

0 represents an income decreasing depreciation change;

1 represents no change; and,

2 represents an income increasing change.

In the discriminant analysis, the CHANGE dependent variable is used to assess if firms that change their depreciation methods differ in significant ways from firms that do not change depreciation methods.

For example, if a firm that uses income increasing methods (e.g., straight-line) changes the depreciation method used, an income decreasing method (e.g., declining balance) is likely to be selected. But, an income increasing change can also result if a firm uses the same depreciation method and simply depreciates the capital assets over a longer period (i.e., uses a lower rate).

A depreciation METHOD dependent variable is also used for comparison to previous depreciation method studies (see Chapter 2), and, thus, to validate the sample and models being used in this study. The variable METHOD is used to report the depreciation method used by firms at the beginning of the test period. Three METHODs are reported:

1. straight-line,
2. declining balance, and
3. combination and other methods.

As the results of multivariate analysis of firms that use different METHODs have been

previously reported in the accounting literature, the results from the adaptation of the analysis are not included in the main body of this paper. Rather, they are included in Appendix 8.

Selection of independent variables

Positive accounting and tax theory research has shown that

1. firm size,
2. capital intensity,
3. leverage,
4. firm control, and
5. the existence of earnings-based management incentive plans

are significantly related to the choice of depreciation methods and effective tax rates. Concentration, risk, and net monetary assets have also been used as explanatory variables, but with less convincing results. These independent economic variables have been used in several accounting and income tax multivariate studies, and a summary of their importance is included as Appendix 1.

Several independent financial variables were considered in determining which influential variables to use in the analysis of depreciation change firms. The independent variables, for which data were collected for this study, include most significant variables from other accounting method choice research and variations thereof, with the addition of a new tax exposure variable. The analysis uses four independent variable groupings—size, capital intensity, leverage, and tax exposure—to contrast the different firm groupings. The independent variables used in this study were selected from the following sixteen potentially influential variables. In this study, the significance of the tax exposure variable is emphasized as it is the main contribution of this research.

Size is used as a proxy for political visibility. Size measures tested are:

ASSETS	Total assets, net of accumulated depreciation
REV	Gross revenue for the year
EQUITY	Shareholders' equity (sum of share capital and retained earnings)
INC	Net income before income taxes and extraordinary items
NIB4TD	Net income before income taxes, extraordinary items, and depreciation

Capital intensity is a measure of the importance of capital assets to a firm. The following capital intensity variables are considered:

CAPASS	Net capital assets (total capital assets less accumulated depreciation)
CAP/REV	Net capital assets/gross revenue. This measure controls for size.
TCAPASS	Total capital assets (net capital assets plus accumulated depreciation)
TCAP/ASS	Total capital assets/total assets. This measure controls for size.
TCAP/REV	Total capital assets/gross revenue. This measure controls for size and depreciation policies.
ACCUM	Accumulated depreciation

Leverage is a proxy for the existence of restrictive debt covenants. Leverage is measured using total debt and variations of the debt/equity ratio.

LTD	Long-term debt
LTDE	Long-term debt/shareholders' equity
TDE	Total debt/shareholders' equity
TD/TA	Total debt/total assets

Tax exposure is a proxy for the exposure a firm has to potential capital cost allowance rate reductions. Tax exposure is measured using deferred tax expense for the current year—DEFTAX.

The determination of a reasonable measure to proxy tax exposure to subsequent capital cost allowance rate changes is difficult. There is no measure that is reported by firms that approximates the tax exposure related to the potential reversal of excess capital cost allowance claims. In part this is due to inability to predict the future. Also, not all relevant tax information is publicly reported by firms. G.A.A.P. do not require firms to report capital cost allowance claims, the difference between capital cost allowance claims and accounting depreciation, or the tax savings that result from excess capital cost allowance claims. The only pertinent measures reported that are related to potential tax exposure are depreciation expense, and current and accumulated deferred income taxes.

Canadian firms are required to use the tax allocation method of accounting for income taxes as recommended in the *CICA Handbook*, section 3450. Income taxes are provided for in the year transactions affect net income, regardless of when such transactions are recognized for income tax purposes. For example, if a firm claims capital cost allowance in excess of accounting depreciation, the related timing difference gives rise to deferred income taxes. The amount of the current and accumulated tax deferral is disclosed in annual reports. The *CICA Handbook* also suggests that the nature of timing differences be disclosed. Therefore, an analysis of the components of deferred tax amounts should measure the exposure a firm has to changes in accelerated capital cost allowances.

An attempt was made to define a variable, FACTOR, to measure the percentage of deferred taxes that are related to the excess of capital cost allowance over accounting depreciation for each firm for 1984. Firms that have high FACTORs would have primarily depreciation-CCA differences. On the other hand, firms that have low FACTORs would primarly have other timing differences, such as deferred revenue for financial reporting or scientific expenditures that are fully tax deductible in the year they

are incurred. However, Table 5 shows that only 130 (51%) of the sample firms disclosed timing difference detail in their annual reports, making any test results using the variable FACTOR questionable.

Table 5

Reporting of component information for deferred income taxes

Timing difference detail reported in annual report	FACTOR variable	No. of firms
Specific information reported	0.09 to 0.69	8
No deferred tax expense	0.00	49
Reference to "Substantially all of the timing differences result from an excess of CCA over accounting depreciation"	1.00	73
Sub-total		130
Breakdown not provided		125
Total		255

A different tax exposure measure that controlled for firm size, DEFRATIO, was also tested. DEFRATIO was calculated as the ratio of deferred tax expense over net income before income taxes. This scaled variable, which measured the effective deferred tax rate as a percentage of net income, was not significant in any of the models.

To measure a firm's tax exposure to subsequent capital cost allowance tax policy changes, this study uses current deferred tax expense as reported on a firm's income statement. Current deferred tax expense is the result of multiplying current tax rates by current timing differences, most of which relate to excess capital cost allowance claims

for the current year[2]. Timing differences can also arise, for example, when scientific research expenditures are capitalized in the accounting records, but are deducted in the calculation of taxable income.

Current deferred tax expense proxies for a firm's increase in current taxes payable if capital cost allowance rates are reduced to equal accounting depreciation rates. An important assumption is that all of the timing differences relate to depreciation. This assumption was also made in Thornton's (1987) study of *Inflation, accounting and the Canadian corporate tax base*,

Deferred tax expense is used, rather than the accumulated deferred tax balances, to estimate total exposure to capital cost allowance tax changes. The former is a current measure using current capital cost allowance and effective tax rates, which will improve comparability among firms. Also, deferred income tax expense incorporates firm-specific tax factors, like the small business and the manufacturing and processing deductions. Accumulated deferred taxes do as well, but they are a potpourri of deferred tax expenses from previous years, when capital cost allowance and tax rates varied.

Deferred income tax expense is positive (a debit amount) for most firms, consistent with the trend of capital cost allowance claims exceeding accounting depreciation expense and of increasing deferred income taxes. If capital cost allowance rates are reduced in the future, the excess will be less, so deferred income taxes will be less and current income taxes payable will be higher. Therefore, the tax exposure variable can be used as a proxy of the annual cash cost to a firm if capital cost allowance rates are reduced to approximate accounting depreciation rates.

---

2 Between 69 and 79 percent of deferred tax expenses are projected to result from excess capital cost allowance claims. The 1976 CCA Survey reported that from 1973 to 1976 the annual increase in deferred income taxes related to depreciation differences for surveyed corporations ranged from 69 to 79 percent. Also, a Price Waterhouse survey of deferred tax detail from the financial statements of 882 U.S. firms, between 1981 and 1983, revealed that 69 percent of deferred taxes relate to depreciation differences (Chaney and Jeter, 1989).

The following cases outline the steps involved when the tax exposure variable is affected by changes in accounting or tax depreciation:

Case A An income decreasing depreciation policy change will be voluntarily selected, if a firm chooses to reduce its depreciation tax exposure. This can be achieved by closely aligning accounting depreciation rates with capital cost allowance rates. This voluntary change will result in:

1. an increase in depreciation expense,
2. a decrease in timing differences,
3. a decrease in deferred tax expense,
4. reduced tax exposure,
5. no change in taxable income and current taxes payable, and
6. a decrease in reported accounting income.

Case B If capital cost allowance rates are reduced to more closely approximate accounting depreciation rates, the effects will be:

1. a decrease in capital cost allowance claimed,
2. a decrease in timing differences,
3. a decrease in deferred tax expense,
4. reduced tax exposure,
5. an increase in taxable income and current taxes payable, and
6. no change in reported accounting income.

While steps 2-4 remain the same as in Case A, step 5 has a negative effect on cash flow of a firm. Thus, this case is less favourable for firms.

Case A results from the voluntary action of a firm and Case B from tax authority initiatives and regulatory changes. While both cases result in reduced tax exposure, Case A is preferred by the firm to minimize cash outflows for a firm. Therefore, firms

with high tax exposure should select income decreasing accounting depreciation policies to reduce their tax exposure, and, thus, minimize the possibility of having Case B imposed on them.

Sample data

Annual reports for Canadian public corporations were used to obtain data for a sample of approximately 100 firms that changed depreciation methods and/or rates between 1984 and 1988. Data were first collected from all hard copy annual reports on file in the Winspear Reading Room at the University of Alberta, a convenient data source to access. Included in this collection are reports for the top 500 Financial Post corporations and most corporations registered with the Alberta Securities Commission. There are 66 change firms in this group, and information was collected from 65 no change firms. Although there were many other no change firms in the group, the no change sample was restricted by randomly collecting no change information from reports in alternate file drawers. As the sample obtained from the hard copy reports was not large enough, an alternate source including reports for corporations across Canada was used.

Next, data were obtained from microfiche copies of annual reports for all firms listed with the Ontario Securities Commission. In this collection, there are at least two thousand annual reports on file for each year, so only the most physically accessible reports were surveyed. These included three groups of reports for firm names beginning with the following letters:

1. A. & W. to Blu
2. Hal to How
3. Nia to Nu

Among this group, there are 50 change firms, and information for 86 no change firms was collected from alternate rows of microfiche. The total sample was checked to ensure that firms are only included once.

Firms that did not have an annual report on file for 1984 and 1988 are excluded, along with firms that did not report any depreciable assets, or adequate depreciation policy information. Natural resource sector firms that do not separately disclose capital assets and depreciation expense are excluded. Also, firms that had extreme changes in their capital asset mix are not included for lack of comparability between 1984 and 1988. There are about fifteen firms excluded for the latter reason. Next, eight firms with a negative equity balance were eliminated to avoid problems in the calculation of the debt/equity ratios. The final sample is biased in excluding service firms that have no capital assets and natural resource sector firms, and there is a survivorship bias.

Sample period

The study will focus on a recent four-year period in which capital cost allowance tax policy substantially changed in Canada (1985 to 1988). The objective is to emphasize the effect of tax policy changes on accounting depreciation changes. During this four-year period, the tax reform publicity should have made management of firms particularly sensitive to the changes in the CCA system. Therefore, if accounting depreciation method changes are influenced by tax policy, the influence should be obvious in this period.

The tax reform proposals were announced in 1985, so 1984 annual report information is collected for pre tax reform. The tax reform changes were officially announced in 1987, and most were effective for January 1, 1988. Thus, post tax reform information is collected from 1988 annual reports. Also, these reports are the most recent on file for the majority of the firms.

In selecting the sample period, the number of years was minimized to prevent data contamination from other macroeconomic factors, although such effects cannot be ruled out for this four-year period. On the other hand, the period is long enough to ensure that firms likely to make financial policy changes have done so, and have reported the changes in their annual reports.

Financial data

For the sample firms, accounting policy notes for 1984 and 1988 were compared to determine whether each firm changed its depreciation policy in the intervening period. For change firms, data on pre and post tax reform depreciation methods and rates by classes were collected, along with financial information from their 1984 annual report. Financial information was also collected from 1984 annual reports for approximately 150 no change firms. This sample is larger than the change firms sample, to provide alternates when selecting no change firms for the matched-pair tests with change firms.

A summary of the variables for which data were collected and the variable labels used in the multivariate analyses is included as Appendix 2. Also, a summary of the financial data collected for each firm in the sample is included in Appendix 3. The financial data summaries are organized as follows:

1. All firms, in alphabetic order by name of company.
2. All firms, in order of largest to smallest by total assets.
3. Change firms, in order of largest to smallest by total assets.
4. No change firms, in order of largest to smallest by total assets.

Before proceeding with the data analysis, histograms of the distributions of the variables were reviewed to determine if there were any significant outliers. For each of eight financial variables, two histograms are shown in Appendix 4. Histograms for the "original" data set and for the "reduced" set (after removal of selected outliers) are

included. Five firms were eliminated from the sample based on the appearance that they were significant outliers from examination of histograms of the variable distributions. In most of the histograms, the five firms were located outside the clustering of the other firms in the sample. The names of the outlying firms, and their summary financial information are included in Table 6.

Table 6

Identification of outlier firms

Name	Assets	Total capital assets	Revenue	Net income before taxes
Bell Canada	$511,375,400[1]	$14,210,400[1]	$ 5,290,600	$ 1,144,100[1]
Royal Bank	88,002,708[1]	1,475,248	9,017,594	623,980
Canadian Pacific	17,601,949	18,181,949[1]	13,086,000[1]	76,621
BCE Inc.[2]	17,486,000	17,388,400[1]	10,578,700	1,867,900[1]
Ford	2,762,500	1,345,200	12,122,000[1]	537,000
Maximum from sample used and company name	$19,250,081 *National Bank*	$ 3,275,290 *Air Canada*	$ 8,262,700 *Weston, Geo.*	$ 491,000 *Northern Telecom*

All dollar ($) amounts are in thousands.
[1] Occurrences that appeared as outliers on the histograms of the respective variables.
[2] BCE Inc. is a subsidiary of Bell Canada. One of BCE or Bell Canada would have been excluded from the final sample, regardless of whether they were outliers.

The final sample consists of 114 change and 141 no change firms, for a total of 255 firms. There is no missing information for any of the sample firms. Table 7 provides summary categorical information for the final sample.

Table 7

Distribution of sample among CHANGE and METHOD categories

Depreciation method	No. of firms	Change firms: Income decreasing	Change firms: Income increasing	No change	Totals
SL	128	36	30	62	128
DB	83	11	20	52	83
Combination or other	44	12	5	27	44
Totals	255	59	55	141	255

Descriptive statistics

Univariate descriptive statistics for all of the continuous variables are presented in Appendix 5. All but one of the continuous variables have large positive skewness, indicating that each distribution is skewed to the right. This results from having many small firms and fewer large firms in the sample. The sample is characteristic of an oligopolistic market, which is common to many Canadian industries.

Lack of normality is usual for accounting data, and discriminant analysis, the multivariate technique used in this study, is not very sensitive when the variables are not normal (Hair, et al., 1987). Loglinear data transformations of the data reduced the skewness measures to less than 1.0 for all variables except DEFTAX. However, when the loglinear data were used in the tests, the results were not very different from tests using raw data, a common result when using transformed data (Tabachnick and Fidell, 1983). Therefore, no loglinear transforms are reported in this study.

Chapter 5—Empirical results

This chapter summarizes the results of the empirical tests of depreciation method choice and change. A matched-pair nonparametric test is used to determine if there are differences between firms that change and firms that do not change their depreciation methods. The matched-pair results are followed by a brief description of discriminant analysis and a detailed analysis of the results of discriminant functions.

Wilcoxon matched-pair signed-ranks test

For the Wilcoxon matched-pair test, firms are matched on the basis of total capital assets (TCAPASS). This variable is used to match firms with approximately the same total investment in capital assets. For a matched-pair test, this is more meaningful than using total assets in which case firms with vastly different total investment in capital assets could be matched. Also, total capital assets is considered more objective than net capital assets that reflect the varying depreciation policies of firms. While the mix of capital assets may vary substantially between matched firms, the expectation is that most matched firms will have approximately the same relative capital investment in land and depreciable buildings and equipment.

In the first matched-pair test, change and no change firms are listed in numerical sequence by TCAPASS. Change and no change firms are matched if they immediately follow each other in the sequence. If, for example, the pattern results in three change firms being together, the middle firm is dropped because there is no match. From the sample of 114 change firms and 141 no change firms, there are 79 sequential matches.

The assumption being made in this test is that change and no change firms with similar capital asset bases will have significantly different influential economic variables. The variables tested—assets, shareholders' equity, and deferred tax expense of matched firms—are chosen because they reflect differences in size, capitalization, and

tax exposure of matched pairs. For each match and for each of the three variables, the differences between the variables are calculated and all of the differences are ranked without regard to sign. Then, to each rank, the sign of the difference is added and the sums of each of the positive and negative differences is determined. *Z* values are calculated using the smallest of the positive or negative sums for each variable (Siegel, 1956). This test would be more powerful if firms could have been matched based on total capital assets and industry classifications. The latter information was not available from the annual reports used as the data source. Also, the sample size was probably not large enough to yield a sufficient number of matched-pairs based on size and industry classification. The results of this matched-pair test are summarized in Table 8.

Table 8

Wilcoxon matched-pair signed-ranks test

Change and no change firms matched on TCAPASS

Variables	N	Z-value	P-value
ASSETS	79	-16.00	.0000
EQUITY	79	-0.50	.6161
DEFTAX	* 75	-15.10	.0000

* Pairs with zero difference eliminated.

The signed-ranks tests show that, for change and no change firms, the ASSETS (total assets) and DEFTAX (deferred tax expense) variables differ significantly. However, EQUITY (shareholders' equity) is not significantly different for the two groups.

In the second matched-pair test, income increasing and income decreasing change firms were matched. From the sample of 114 change firms, there are 22 sequential matches requiring the use of small sample procedures. Among the matched change firms, each of ASSETS, EQUITY, and DEFTAX differed significantly at the .05 level.

Discriminant analysis

The discriminant analyses use variables common to previous depreciation method choice studies, with the addition of a new tax exposure variable. Size, capital intensity, and leverage variables are used, but risk and earnings-based management incentive plan variables are not used because the information was not readily available from the annual reports or other publicly available data.[3] A tax exposure variable is introduced to try and determine if income tax factors influence the choice of depreciation methods. Also, Canadian data is used.

Broad consistency with previous studies, particularly with the size and debt/equity hypothesis, is expected (Watts and Zimmerman, 1978; Hagerman and Zmijewski, 1979; Zmijewski and Hagerman, 1981; Dhaliwal et al., 1982). That is, when making changes in depreciation policy, managers of large firms should choose depreciation methods that reduce current earnings. Also, the larger a firm's debt/equity ratio, the more likely management is to select accounting methods that increase current earnings.

Returning to the four hypotheses that were presented at the end of Chapter 3, each hypothesis is tested in a separate scenario. The hypotheses are:

H1: Among firms that change accounting depreciation methods, firms that select income decreasing methods will have the same tax exposure as firms that select income increasing methods.

H2: Firms that change accounting depreciation methods will have the same tax exposure as firms that do not change accounting depreciation methods.

---

3 Information about management incentive plans and management bonuses is reported in the preliminary prospectus filed with the Ontario and Alberta Securities Commissions, but registered firms are not required to file updates on a regular basis. Further, prospectus information is not available in the Winspear library.

H3: Firms that do not change accounting depreciation methods or select income decreasing depreciation change have the same tax exposure as firms that select income increasing depreciation changes.

H4: Firms that select income decreasing depreciation changes have the same tax exposure as firms that do not change depreciation methods or firms that select income increasing depreciation changes.

The associated depreciation change scenarios that are analyzed using discriminant analysis are outlined in Table 9.

Table 9

Grouping of firms for discriminant analysis

Scenario number	Dichotomous dependent variable groupings (number of firms in brackets)	
Change	*Group 0*	*Group 1*
1.	Income decreasing method change (59)	Income increasing method change (55)
2.	No change in method (141)	Change in method (114)
3.	No change and income decreasing change (200)	Income increasing method change (55)
4.	Income decreasing method change (59)	No change and income increasing change (196)

If there is a significant difference between change groups, the model for the first scenario should reveal the greatest difference and hypothesis 1 should be rejected. This would result because the changes are opposite with 0 representing firms with income

decreasing changes and 1 representing firms with income increasing changes. This model will only be useful in explaining and predicting the effect on income of depreciation changes, but it will not aid in the prediction of change. The matched-pair test shows that income increasing and income decreasing change firms differ significantly with respect to ASSETS, EQUITY, and DEFTAX.

If there is a significant difference between change and no change firms, model 2 will be useful in predicting change, regardless of the direction, and hypothesis 2 should be rejected. This model, used in conjunction with the first, will assist in predicting the likelihood and direction of depreciation method changes. The matched-pair test shows that change and no change firms differ significantly with respect to ASSETS and DEFTAX. The discriminant analysis will refine the testing of change and no change firms.

Similarly, the third and fourth model will result from the test of hypotheses 3 and 4. The third model will help identify firms that select income increasing depreciation methods and other firms that do not change their method or select income decreasing methods. This model, along with model 4, discriminates groups that are less different from those in scenarios 1 and 2, thus, the results should be less significant.

The fourth model predicts firms that select income decreasing depreciation methods and other firms that do not change their method or select income increasing methods. This model tests the hypothesis that firms with higher tax exposure are more likely to change depreciation methods than other firms. Other firms are not likely to change depreciation methods, or, for different reasons, adopt income increasing changes.

Selection of influential variables for custom model

To select a reduced set of independent variables for this study, the four CHANGE and two METHOD scenarios are analyzed using discriminant analysis. Full models are

determined with all variables included. Then, variables that are significant in more than one of the models are considered for inclusion in a custom model. Appendix 6 lists variables that are significant at the .05 level in these tests, and outlines the criteria used to select independent variables for this study. The selected variables, summarized in Table 10, will be referred to as the custom model variables. These variables are used throughout the rest of this study for the analysis of various depreciation change and method scenarios. By contrast, the full models include all of the potentially influential variables identified. When the full models are used, no attempt is made to isolate or adjust for possible interaction among the variables.

Table 10

Selected variables for custom model

Variable group	Variable	Description
Size	ASSETS	Total assets
	EQUITY	Shareholders' equity
Capital intensity	CAP/REV	Net capital assets/revenue
Leverage	TDE	Total debt/shareholders' equity
Tax exposure	DEFTAX	Deferred tax expense

Each variable grouping of size, capital intensity, leverage, and tax exposure is represented with five variables included in the custom model. Note that EQUITY is classified as a size variable. EQUITY measures the amount of equity-financed capital that a firm has, which is not directly related to total ASSETS. In addition to the custom-picked continuous variables, the categorical variables—CHANGE (depreciation change) and METHOD (depreciation method used)—are included in the custom model analyses.

The correlation matrix of the five continuous variables in the custom model is included in Table 11. A correlation matrix for all variables is included as Appendix 7.

Table 11

Correlation matrix of variables in custom model

	ASSETS	CAP/REV	DEFTAX	EQUITY
ASSETS	1.00			
CAP/REV	.05	1.00		
DEFTAX	.23	.05	1.00	
EQUITY	.59	.05	.49	1.00
TDE	.10	.21	-.04	-.07

A review of the correlation matrix reveals that ASSETS and EQUITY have a correlation of .59, DEFTAX and EQUITY have a correlation of .49, and all others are below .24. This study assumes that the correlation between ASSETS and EQUITY is not significant enough to have undesirable interaction effects. EQUITY and ASSETS are included for two reasons. ASSETS is included because of its tradition of being influential in accounting method choice studies. EQUITY is included because of its significance in the preliminary analysis, and because it has not been previously used and reported in a similar study. Thus, in addition to DEFTAX (the tax exposure variable), EQUITY is considered a "new" potentially influential variable. The primary objective is to determine if the variables included in the custom model provide significant explanatory and predictive ability that can be generalized to other tax policy and accounting method choice analyses.

Discriminant analysis of changes in depreciation methods

When each scenario is analyzed using discriminant analysis, there are at least two significant variables in each resulting discriminant function. As well, three of the four scenarios result in a significant discriminating function at the .05 level. For each of the four scenarios, the results of the discriminant functions are presented, followed by summary statistics, and an analysis of the results.

Scenario 1—Firms with income decreasing and income increasing depreciation method changes

Table 12

Discriminant function analysis of firms

using income decreasing and income increasing change firms

Variables in custom model		Function coefficients (C_{jp}) Income decreasing	Income increasing	Significance of Wilk's Lambda
Continuous variables	DEFTAX (thou)	.083	.029	.0195
	EQUITY (mil)	4.033	2.423	.0335
	TDE	.070	.008	.0218
Categorical variables	METHOD	.878	1.206	.0190
Sample size (N)		59	55	
Group means		.3209	-.3443	
Canonical correlation			.3180	
Chi-square and the significance level			11.724	.0195

The comparison of income decreasing and income increasing firms reveals that DEFTAX, EQUITY, TDE, and METHOD variables are all significant at the .04 level or less.

A review of the function coefficients reveals that if EQUITY and DEFTAX are high, firms are likely to choose an income decreasing strategy. The high EQUITY result is consistent with the size hypothesis, in that large, equity-financed, firms prefer to choose income decreasing accounting policy changes presumably to reduce their political visibility. The high DEFTAX result is consistent with the thesis of this paper—when tax exposure is high, firms are likely to choose income decreasing depreciation methods to minimize the possibility of prospective unfavourable tax changes. This will be achieved by aligning accounting depreciation rates and methods with the capital cost allowance system. Depreciation expense will more closely approximate capital cost allowance, deferred tax expenses will be less, and so will a firm's tax exposure.

If the TDE (total debt/equity) is high, firms are likely to choose an income decreasing strategy. For these firms, total debt, including trade liabilities, deferred revenue, current and deferred income taxes payable, shareholders' loans, and dividends payable, appears to be more influential than, for example, LTDE (long term debt/equity), probably because high TDE firms may be less influenced by traditional long-term debt covenants. This result is contrary to the debt/equity hypothesis, but this may be due to high TDE firms attempting to minimize cash outflows. That is, firms and their creditors may be more concerned about cash flow (e.g., minimizing tax liabilities) than about encroaching upon debt covenants. This preference should maximize cash flows by minimizing income taxes, dividends payable, and management bonuses.

Approximately 32 percent of the variation among the two groups is explained by the discriminant function, which is significant at the .02 level. The discriminant function for income decreasing and income increasing firms has the highest explained variation among the four scenarios (.32 compared to .20, .15, and .21 for scenarios 2, 3, and 4, respectively). This is expected because the groups are clearly different as the

depreciation changes are opposite. Thus, hypothesis 1 is rejected—firms that select income decreasing accounting depreciation methods differ significantly from firms that select income increasing methods.

Scenario 2—Discrimination of change and no change firms

Table 13

Discriminant function analysis of change and no change firms

Variables in custom model		Function coefficients (C_{jp}) No change	Change	Significance of Wilk's Lambda
Continuous variables	ASSETS (mil)	-.083	.087	.0315
	DEFTAX (thou)	.025	-.002	.0208
	EQUITY (mil)	2.304	1.700	.0434
Categorical variables	METHOD	1.373	1.014	.0358
Sample size (N)		141	114	
Group means		.179	-.221	
Canonical correlation			.1960	
Chi-square and the significance level			9.832	.0434

Firms that did not change their depreciation methods tend to have higher DEFTAX and EQUITY, than firms that did change. Thus, high tax exposure and relatively high equity balances typify firms that do not change depreciation methods. These firms have maximized their current tax deductions, so they have high tax exposure because capital cost allowance claimed is greater than reported accounting depreciation. These results are inconsistent with the thesis of this paper, that firms with high tax exposure are likely to change their depreciation policies to minimize the exposure to possible reductions in capital cost allowance rates.

On the other hand, firms that did change their depreciation methods, tended to have high ASSETS. This result could mean that large firms with high political exposure are likely to change to reduce that exposure, which is consistent with the size hypothesis. These results could indicate that the firm size is the most influential of the three significant variables.

The results of this analysis are ambiguous, which is probably due to the nature of the change control group. Change firms include both income decreasing and income increasing change firms, and each group has very different objectives. The inclusion of opposites in one group likely has a neutralizing effect. The diversity of firms in the change group interferes with a meaningful interpretation of the results. While the matched-pairs test revealed that change firms differ significantly from no change firms, we should not accept or reject hypothesis 2 based on the analyses. So, the results from this scenario will not weigh heavily in the conclusions.

Scenario 3—[Firms with income decreasing change or no change] and [firms ith income increasing change]

Table 14
Discriminant function analysis of
[firms with income decreasing change or no change] and
[firms with income increasing change]

Variables in custom reduced model		Function coefficients (C_{jp}) Income decreasing or no change	Income increasing change	Significance of Wilk's Lambda
Continuous variables	DEFTAX (thou)	41.338	5.211	.0859
	TDE	.075	.0411	.0673
Sample size (N)		200	55	
Group means		.077	-.279	
Canonical correlation			.1456	
Chi-square and the significance level			5.397	.0673

In this scenario, it is possible that some high tax exposure firms are among the no change group in that they have already done all they can to minimize tax expense. That is, some high tax exposure firms may have anticipated tax reform before it was publicly announced.

The function coefficients reveal that firms with high DEFTAX and TDE are likely to select income decreasing depreciation policies or no change at all, over income increasing policies. The DEFTAX result is consistent with scenario 1 and with the thesis that firms with high tax exposure will choose income decreasing policies over income increasing policies. However, the TDE results are inconsistent with the debt/equity hypothesis, but they are consistent with the TDE effect in scenario 1. That is, firms with high total debt to equity will select income decreasing policies. The model from scenario 3 is marginally significant at the .07 level, supporting the rejection of hypothesis 3. Firms with income decreasing changes or no change appear to be significantly different from income increasing firms.

Scenario 4—[Firms with income decreasing changes] and [firms with no changes or income increasing changes]

This scenario should discriminate firms that have high tax exposure from firms that do not. The high tax exposure firms should be motivated to change their depreciation methods to achieve an income decreasing effect over firms with other objectives (e.g., firms in which management attempts to maximize earnings-based incentive plan allocations).

Table 15

Discriminant function analysis of

[firms with income decreasing changes] and

[firms with no changes or income increasing changes]

Variables in custom reduced model		Function coefficients (C_{jp}) Income decreasing change	Income increasing or no change	Significance of Wilk's Lambda
Continuous variables	ASSETS (mil)	.384	.204	.0107
	TDE	.063	.028	.0091
Categorical variables	METHOD	.678	1.123	.0151
Sample size (N)		59	196	
Group means		.394	-.118	
Canonical correlation			.2119	
Chi-square and the significance level			11.552	.0091

Income decreasing change firms tend to have a high ASSETS base and high TDE. The high ASSETS base for income decreasing change firms is consistent with the size hypothesis. The TDE effects are consistent with the results for scenarios 1 and 3, and appear to contradict the debt/equity hypothesis. The rationale for this has already been presented. DEFTAX did not enter this model, and it is not obvious why this is so considering that DEFTAX is significant in the previous three models. A possible explanation is that some influential variables are missing from the analysis.

The model is significant at the .01 level, so hypothesis 4 is rejected. Firms that select income decreasing changes differ significantly from firms that make no change or have income increasing changes.

Comparison of full and custom models

Table 16 includes summary statistics for the discriminant analysis of each scenario using the full model and the custom model.

Table 16
Summary statistics for discriminant analysis of change firms

	Method change				Method used	
Significant independent variables	Income increase v. Income decrease	Method change v. No method change	Income. increase v. Other	Income decrease v. Other	SL v. DB	DB v. Other methods
Full model						
Canonical Correlation	.3180	.2067	.1623	.2261	.4161	.3945
Chi-Square	11.724	10.935	6.725	13.170	38.791	42.034
Significance	.0195	.0527	.0347	.0105	.0000	.0000
Custom model						
Canonical Correlation	.3180	.1960	.1456	.2119	.3512	.3229
Chi-Square	11.724	9.832	5.397	11.552	27.246	27.645
Significance	.0195	.0434	.0673	.0091	.0000	.0000
Models	Comparison of canonical correlations					
Full	.3180	.2067	.1623	.2261	.4161	.3945
Custom	.3180	.1960	.1456	.2119	.3512	.3229
Maximum difference	.0000	.0107	.0167	.0142	.0649	.0716

For the change scenarios, the canonical correlations for the full models only provide a marginal improvement over the custom models, with each improvement in explanatory power being less that 2 percent. These results indicate that the custom model, using the following significant variables, can be used as predictors of change firms.

Grouping	Variable
Size	ASSETS and EQUITY
Leverage	TDE
Tax exposure	DEFTAX

Summary of discriminant analysis of firms using different depreciation methods

The analyses in Appendix 8 and Table 16 reveal that, for the depreciation method scenarios, the improvement in explanatory power by use of the full model over the custom model is between 6 and 7 percent, indicating that some important influential variables are excluded in the custom model. These differences are not investigated and additional influential variables are not considered because the emphasis of this paper is on differences among firms that change their depreciation methods, rather than on the differences between firms that select alternative depreciation methods.

Briefly, the analyses of these scenarios reveal that firms with high capital intensity and shareholders' equity will select income increasing (e.g., straight-line) depreciation methods. This is inconsistent with the size hypothesis, which predicts that large, capital intensive firms, will select income decreasing methods. The straight-line preference probably results because straight-line is the easiest and most economical depreciation method to administer, especially among large, multi-branch, operations.

Highly leveraged firms will prefer declining balance methods, which is inconsistent with the debt/equity hypothesis. This preference may result from highly leveraged firms preferring to maximize cash flow. These firms probably attempt to minimize cash outflows that are linked to reported earnings (e.g., dividends and earnings-based management incentive plans) rather than ensure that debt covenants are met.

Classification results of discrimination functions

Discriminant analysis is useful for its predictive capabilities, and typically prediction is used with hold-out samples. Unfortunately, the data set used for this paper was not large enough to afford the luxury of control and hold-out samples.

A classification matrix for each model was prepared that revealed the predictive ability of the discriminant function. The classification results for the six scenarios are reported in Table 17. The naive assumption predicts that all observations will fit in the category with the highest incidence.

Table 17
Classification on basis of discriminant functions

	Method change				Method used	
Scenario »	1	2	3	4	5	6
Significant independent variables	Income increase v. Income decrease	Method change v. No method change	Income. increase v. Other	Income decrease v. Other	SL v. DB	DB v. Other methods
Full model	59.65%	56.47%	78.43%	77.65%	70.14%	73.33%
Custom model	59.65%	56.08%	78.43%	76.86%	65.88%	69.41%
Naive assumption	51.75%	55.29%	78.43%	76.86%	60.66%	69.41%
Maximum increase in predictive ability	7.90%	1.18%	0.00%	0.79%	9.48%	3.92%

The classification results of the discriminant analyses reveal three very significant and two marginally significant functions among the six depreciation scenarios. Of the change scenarios, the classification function for scenario 1 improves by 7.9 percent, whereas the other improvements range from none to 1.18 percent. Scenario 1, that compares income increasing and income decreasing change firms, provides the clearest

delineation of change, and results in the greatest improvement in predictive ability in scenarios 1 through 4. Also, for this scenario, the custom and the full model have the same predictive power. To explain, the use of model 1 allows for 60 percent of firms to be classified correctly. Without the model, there would be only 52 percent classified properly. Models 2 and 4, while significant, result in only a small improvement in predictive ability.

The classification functions for choice of depreciation methods result in significant improvements of 9.48 percent and 3.92 percent. While the explained variations are significant in all but one scenario, the linear variations among depreciation change firms are not as robust as they are among firms with different depreciation methods (see Appendix 8).

Logistic regression

Logistic regression is used to corroborate the discriminant analysis tests, which are summarized earlier in this chapter. Logistic regression is used to specify a full and custom model for each of the six scenarios. As with the discriminant analyses, custom models are produced using the six common variables—ASSETS, CAP/REV, DEFTAX, EQUITY, TDE, and CHANGE.

The summary statistics for discriminant analysis and logistic regression are not directly comparable, but a trend analysis of the changes is informative. The comparison of the discriminant analysis canonical correlations and the R-square's from the logistic regression follows in Table 18. Similar trends among the depreciation change and method scenarios is apparent. The depreciation method scenarios have the greatest explanatory power using both multivariate techniques. The variation explained by the

logistic regression substantially diminishes from scenario 1 (.10) to the analyses of the last three depreciation change scenarios (.025 to .05), whereas the drop-off in the discriminant analysis is not as dramatic (from .32 to .14).

This simple comparison is an easy way to show why discriminant analysis is used as the primary multivariate technique in this study. As the R-square results reveal in Appendix 9, the linear relationship between the change in depreciation methods and the economic variables is insignificant (greater than .05) for three of the change scenarios. However, the canonical correlations reveal that the discriminant functions for these scenarios explain from .15 and .32 of the variation between the dependent groups. The superior explanatory ability of discriminant analysis is obvious.

Table 18

Summary statistics for discriminant analysis and multiple regression custom models

Significant variables (custom model)	Income increase v. Income decrease	Method change v. No method change	Income. increase v. Other	Income decrease v. Other	SL v. DB	DB v. Other
Canonical Correlation	.3180	.1960	.1456	.2119	.3512	.3229
R-square	.1014	.0412	.0255	.0492	.1263	.1069

Chapter 6—Conclusion

Summary of results of discriminant analysis of change firms

1. TAX EXPOSURE - The independent variable DEFTAX is significant in change scenarios 1, 2, and 3. Given a change in depreciation method(s) used, this indicates that the tax exposure proxy of deferred tax expense is associated with the type of change, and, specifically with the selection of income decreasing methods over income increasing methods. After removing scenario 2 from the subsequent analyses, because of inconsistencies between the control groups, these results support the hypothesis. That is, firms with a high tax exposure are more likely to change their depreciation methods than other firms, and when they do so, they are likely to select income decreasing methods.

2. SHAREHOLDERS' EQUITY - Similar to the results for DEFTAX, the variable EQUITY is significant in change scenarios 1 and 2. Likewise, EQUITY is related to depreciation change, and to the selection of income decreasing depreciation methods. Thus, firms with a high, equity-financed, capital base are more likely to change their depreciation methods than other firms. Further, among the change firms, those with higher EQUITY amounts are likely to select income decreasing depreciation methods. To the extent that EQUITY is related to size of a firm, these results support the size hypothesis.

3. DEBT/EQUITY - The leverage variable TDE is significant in change scenarios 1, 3, and 4. In each case, firms with high TDE are more likely to select income decreasing depreciation method or no change, over firms that select income increasing methods. This result appears to be inconsistent with the debt/equity hypothesis which predicts that change firms would select income increasing changes. The debt/equity hypothesis seems to be based on the traditional

mechanistic hypothesis of financial reporting which presumes that users, and especially agents can be fooled by a change in an accounting policy, even if there is no related cash flow effect.

The choice of income decreasing policies by firms with high debt may result from a change in emphasis in the 1980s to cash flow reporting, rather than on window dressing to ensure debt covenants are complied with. This result also appears to indicate that debt holders can see through accounting method changes that do not have a cash flow effect. Also, total debt/equity (TDE) includes the effect of many debt instruments that are not long-term debt. The combined effect of total debt is more influential in predicting depreciation change than long-term debt, alone. Management, acting in the interest of the firm's agents, appears to select income decreasing depreciation method changes to ensure that cash flow is maximized. This could result, for example, from lower income taxes, lower bonus payments, and reduced union settlements. A new approach to the debt/equity hypothesis is needed to be consistent with contemporary financial reporting and monitoring procedures used by debt holders.

4. CAPITAL INTENSITY - The capital intensity variable (CAP/REV) is not significant in any of the change models, so it is not influential in explaining or predicting depreciation changes.

5. SUMMARY STATISTICS - The variation explained by the discriminant functions ranges from .15 to .32. For each scenario, the custom model explains:

   Scenario 1 - 32 percent of the variation between firms that choose income increasing and income decreasing depreciation changes, which is significant at the .02 level.

Scenario 2 - 20 percent of the variation between change and no change firms, which is significant at the .04 level.

Scenario 3 - 15 percent of the variation between firms that choose income increasing depreciation changes, and other firms, which is significant at the .07 level.

Scenario 4 - 21 percent of the variation between firms that choose income decreasing depreciation changes and other firms, which is significant at the .01 level. The improvement in the explanatory power of scenario 4 over scenario 3 is encouraging and provides support for the hypothesis that firms with high tax exposure will select income decreasing depreciation changes.

Limitations of study

Tax policy changes

1. INTERNATIONAL INFLUENCES - The influence of international, particularly U.S. tax policy, on the Canadian tax regime is not considered as a potentially significant variable this paper. If international trends are more influential than domestic affairs, the conclusions reached are weaker. There is little doubt that tax reform was influenced by international trends, and especially U.S. tax reform. However, there are important differences between the tax systems of most industrialized countries so there is some insular effect in most systems, the Canadian tax system included. For example, in Canada there is a $100,000 capital gains exemption, and there is no similar provision in the U.S. Canada does not have an alternative minimum tax for corporations, whereas, the U.S. does. Thus, for this paper, the Canadian tax regime is presumed to be autonomous. Therefore, domestic changes in accounting policies and methods are assumed to significantly influence future tax changes.

2. OTHER TAX CHANGES - Corporate tax reform was comprehensive, and it did not only include changes to the capital cost allowance system. Other substantial changes included a general federal tax rate reduction from 36 percent to 28 percent of taxable income, an immediate drop in the manufacturing and profits deduction from 7 percent to 2 percent (with a gradual increase to 5 percent), the phasing out of most investment tax credits, the introduction of a general anti-avoidance rule, and an increase in the taxation of capital gains from one-half to three-quarters of the total gain. The interaction of these changes with the changes to the capital cost allowance system is not considered.

3. PERIOD SENSITIVITY - The changes to the capital cost allowance system in the sample period were substantial, and a repeat of the changes of a similar magnitude is unlikely in the near future. While depreciation change probably was influenced by the tax changes, it is unlikely that the results can be duplicated in other years.

3. CRITICAL EVENT DATE - It is difficult to determine if management of firms anticipated the tax reform changes that were first introduced in 1985. If so, then related changes in depreciation methods could have been made during or before 1984, in which case this study would not have observed the change. This is a classic problem of accurately defining the critical event date. This paper assumes that management did not anticipate changes to the capital cost allowance system in advance of formal announcement of the proposed changes.

Research design

1. OTHER POSITIVE THEORY VARIABLES - Some variables were not used that have been shown to significantly affect accounting policy choice. Notably, variables are not included for the existence of management incentive plans and whether a

firm is manager or owner controlled, because the information was not available in the annual reports used as the data source. The inclusion of these variables could have materially changed the results.

2. MACROECONOMIC INFLUENCES - The existence of other potentially influential macroeconomic influences on depreciation change is not investigated, and all potentially influential variables are not included. These influences could include such factors as technological advancement, interest and foreign exchange rate fluctuations, inflation, recession, effects of the Canada/U.S. Free Trade Agreement, and public policy initiatives (e.g., grants) outside the realm of the *Income Tax Act*.

3. TAX EXPOSURE PROXY - Deferred tax expense is used as a proxy for tax exposure. In studies for earlier years, between 69 and 79 percent of this expense has been shown to result from the excess of capital cost allowance claims over accounting depreciation. The generalization to the test period is not substantiated. A further limitation is that for individual firms in the sample, using deferred tax expense as a proxy for the capital cost allowance excess may be inappropriate if, for example, their deferred tax expense results entirely from timing differences related to revenue recognition.

4. HOLD-OUT SAMPLE - Discriminant analysis is a good classification technique, but the model(s) should ideally be tested with a hold-out sample. In this study, the data set is not large enough to enable partitioning of a primary test group and a hold-out sample. Thus, the models developed have not been independently tested.

Data used

1. NO CLASS BREAKDOWNS - Firm depreciation changes are aggregated to determine whether a firm has selected an income increasing or income decreasing method change. There is no statistical analysis of depreciation changes on a class

by class basis. For example, depreciation changes among firms that have manufacturing and processing equipment are not considered separately from firms that have construction equipment, even though the influential variables may be very different for firms with different capital asset mixes.

2. NO INDUSTRY BREAKDOWN - Following from the lack of asset class breakdowns, there is no recognition of the different industries within which firms operate. In some studies, the standard industrial classification (S.I.C.) code for a firm is used as an independent variable.

3. SAMPLE BIAS - As described in Chapter 4, the sample is biased in excluding firms:
    - in the oil and gas industry,
    - in the service industry,
    - that have a debit in total equity,
    - created after 1984,
    - that do not survive past 1987,
    - that do not have comparable capital asset bases in 1984 and 1988,
    - private corporations, and
    - that do not have annual reports on file for 1984 and 1988.

Future research

There are many research possibilities that naturally follow from this study, some of which are:

1. INCLUSION OF OTHER VARIABLES - Other potentially influential variables could be included, such as industry codes and owner/manager control. The dependent variable could be change of depreciation method on an asset class basis, rather than on an aggregate capital asset basis.

2. VARIABLE SPECIFICATION - Alternative and better capital asset tax exposure variables could be used. A simple way this could be done is to obtain information on deferred taxes that result exclusively from excess capital cost allowance claims.

3. APPLY TEST TO U.S. DATA - The tests could be applied to U.S. firms, who have immediate tax saving reasons for changing their depreciation methods. The immediate tax savings reasons are stronger than the potential tax saving reasons Canadian firms have. To elaborate, U.S. tax reform introduced an alternative minimum corporate tax (A.M.T.) based on "adjusted net book income". In the U.S., taxable income is effectively increased by certain preference items, such as excess tax depreciation claims, to arrive at an alternative minimum taxable income (A.M.T.I.). The tax payable by a corporation is the greater of a flat tax of 20% of the A.M.T.I. and the regular tax payable. U.S. firms may select accounting methods to minimize the difference between accounting and taxable income and, thus, to minimize their A.M.T. payable. For depreciable assets, U.S. firms may opt to "shorten the estimated economic life, and lower the estimated residual value of assets, thereby reducing the difference between financial reporting and tax depreciation amounts" (Bazley and Tripp, 1989, p. 58). The tax may cause an erosion of the credibility of financial statements as companies seek a competitive advantage in tax minimization (Padwe, 1987, p. 11:10). The influences to change depreciation methods should be more tangible in the U.S. than they are in Canada, so the results from applying the research tests to U.S. data should provide even more convincing results. I believe that this research possibility has more potential to provide significant results than the other two possibilities outlined. This test should be of great interest to U.S. accounting regulators.

Bibliography

Afifi, A. A. and Clark, Virginia. *Computer-aided multivariate analysis*, Lifetime Learning Publications, California, 1984.

Anderson, William D. "A potpourri of elements in computing business income: Part I", *Current developments in measuring business income for tax purposes: Corporate Management Tax Conference 1987*, Canadian Tax Foundation, 1987.

Arnold, B. J. "Conformity between financial statements and tax accounting", *Canadian Tax Journal,* vol. 29, 1981, pp. 476-488.

_____. *Timing and income taxation: The principles of income measurement for tax purposes*, Canadian Tax Foundation, 1983.

Archibald, T. "The return to straight-line depreciation: an analysis of change in accounting methods", *Journal of Accounting Research,* Supplement 1967, pp. 164-180.

_____. "Stock market reaction to the depreciation switch-back", *The Accounting Review*, January 1972, pp. 22-30.

Barefield, R. and E. Comisky. "Depreciation policy and the behavior of corporate profits", *Journal of Accounting Research*, vol. 9, 1971, pp. 351-358.

Bazley, John D. and Tripp, John C. "The corporate alternative minimum tax: Impacts on financial reporting", *Accounting Horizons*, vol. 3, no. 1, March 1989, pp. 54-62.

Beaver, W. *Financial reporting: an accounting revolution,* second edition, Prentice-Hall, New Jersey, 1989.

Berg, Menachem and Moore, Giora. "The choice of depreciation method under uncertainty", *Decision Sciences*, vol. 20, 1988, pp. 643-654.

Boadway, Robin W.; Bruce, Neil; and Mintz, Jack M. "Corporate taxation in Canada: Toward an efficient system", *Tax policy options in the 1980s: Canadian Tax Paper No. 66*, edited by Thirsk, Wayne R. and Whalley, John, Canadian Tax Foundation, February 1982.

_____; _____; and _____. *Taxes on capital income in Canada; Analysis and policy: Canadian Tax Paper no. 80*, Canadian Tax Foundation, 1987.

_____ and Kitchen, Harry M. *Canadian tax policy*, Canadian Tax Foundation, Toronto, 1980.

Bossons, John. *The impact of inflation on income and financing of large non-financial corporations: Supplementary paper no. 5*, Ontario Committee on Inflation Accounting, 1977.

Brown, Robert. "Corporate tax reform: Necessary but not sufficient", *1985 Conference report: Report of proceedings of the thirty-seventh tax conference*, Canadian Tax Foundation, 1986.

_____. "Overview", *The economic impacts of tax reform*, edited by Jack Mintz and John Whalley, Canadian Tax Foundation, 1989, pp. 443-450.

Chaney, Paul K. and Jeter, Debra C. "Accounting for deferred income taxes: Simplicity? Usefulness?", *Accounting Horizons*, vol. 3, no. 2, June 1989, pp. 6-13.

Christenson, Charles. "The methodology of positive accounting", *The Accounting Review,* vol. LVIII, no. 1, January 1983, pp. 1-22.

Christie, Andrew A. "Aggregation of test statistics: An evaluation of the evidence on contracting and size hypotheses", *Journal of Accounting and Economics*, vol. 12, 1990, pp. 15-36.

CICA, *Financial reporting in Canada 1989*, eighteenth edition, Toronto, 1989.

Collins, D.; Rozeff, M.; and Dhaliwal, D. "The economic determinants of the market reaction to proposed mandatory accounting changes in the oil and gas industry: A cross-sectional analysis", *Journal of Accounting and Economics*, March 1981, pp. 37-71.

Cronkwright, G. E. "The dilemma of conformity: tax and financial reporting—A perspective from the private sector", *1981 Corporate Management Tax Conference,* Canadian Tax Foundation, Toronto, 1982, pp. 22-40.

Daly, Michael; Jung, Jack; Mercier, Pierre; and Schweitzer, Thomas. "A comparison of effective marginal tax rates on income from capital in Canadian manufacturing", *Canadian Tax Journal,* vol. 33, no. 6, November-December 1985, pp. 1154-1187.

Department of Finance, Canada. *Account of the cost of selective tax measures,* August, 1985.

_____. *Budget paper C: Capital cost allowances*, May 25, 1976.

_____. *Guidelines for tax reform*, October 23, 1986.

_____. *Supplementary information relating to tax reform measures*, December 16, 1987.

_____. *Tax reform 1987: Income tax reform,* June 18, 1987.

_____. *The corporate income tax system: A direction for change*, May 1985.

Dhaliwal, Dan S. "The effect of the firm's capital structure on the choice of accounting methods", *The Accounting Review*, vol. LV, no. 1, January 1980, pp. 78 - 84.

_____; Salamon, Gerald L; and Smith, E. Dan. "The effect of owner versus management control on the choice of accounting methods", *Journal of Accounting and Economics*, vol. 4, 1982, pp. 41-53.

Domar, Evsey D. "The case for accelerated depreciation." *Quarterly Journal of Economics,* vol. 62, November 1953, pp. 493-519.

Epstein, L. and Denny, M. "Endogenous capital utilization in a short-run production model: Theory and empirical application", *Journal of Econometrics,* 1980, pp. 189-207.

Gillies, James. "Federal tax reform in a pluralistic state: Can it be done?", *The quest for tax reform*, edited by W. Neil Brooks, Carswell, Toronto, 1988, pp. 343-349.

Hagerman, R. I. and Zmijewski, M. E. "Some economic determinants of accounting policy choice", *Journal of Accounting and Economics,* vol. 1, August 1979, pp. 141-161.

Harris, Edwin C. "Measuring business and property income", *The quest for tax reform,* edited by W. Neil Brooks, The Carswell Company Ltd., Agincourt, Ontario, 1988, pp. 103-119.

Healy, P. M. "The effect of bonus schemes on accounting decisions", *Journal of Accounting and Economics,* vol. 7, April 1985, pp. 85-107.

Holthausen, Robert W. "Evidence on the effect of bond covenants and management compensation contracts on the choice of accounting techniques: the case of depreciation switch-back", *Journal of Accounting and Economics,* vol. 3, March 1981, pp. 73-109.

_____ and Leftwich, Richard W. "The economic consequences of accounting choice", *Journal of Accounting and Economics,* vol. 5, 1983, pp. 77-117.

Hulten, C. R. and Wykoff, F. C. "Economic depreciation and the taxation of structures in United States manufacturing analysis", *The measurement of capital*, edited by D. Usher, University of Chicago Press, Chicago, IL, 1980.

Jenkins, Glenn P. *Inflation, its financial impact on business in Canada: Discussion paper no. 72,* Economic Council of Canada, Ottawa, 1977.

_____. "The impact of inflation on corporate taxes and the cash flows of business", *Canadian Tax Journal*, vol. 33, no. 4, July-August 1985, pp. 759-785.

Jobson, Dave. *Multivariate Statistical Analysis*, unpublished, Edmonton, 1988.

Johnson, Orace. "Two general concepts of depreciation", *Journal of Accounting Research*, vol. 8, no. 1, Spring 1968, pp. 29-37.

Kahn, Douglas A. "Accelerated depreciation—Tax expenditure or proper allowance for measuring net income?", *Michigan Law Review*, vol. 78, no. 1, November 1979, pp. 1-58.

Kieso, Donald E.; Weygandt, Jerry J.; Irvine, V. Bruce; and Silvester, W. Harold. *Intermediate Accounting*, second Canadian edition, John Wiley & Sons Canada Limited, Toronto, 1986.

Kim, Moshe and Moore, Giora. "Economic vs. accounting depreciation", *Journal of Accounting and Economics,* vol. 10, no. 2, April 1988, pp. 111-125.

Kwon, O. Yul. "An estimate of asset's useful life and economic depreciation rate, by Canadian CCA classes", *Cost and Management*, vol. 52, no. 5, 1978, pp. 36-38.

Lambden, Charles W.; Gerboth, Dale I.; and McRae, Thomas W. *Accounting for depreciable assets: Accounting Research Monograph 1*, AICPA, 1975.

Leftwich, Richard. "Aggregation of test statistics: Statistics vs. economics", *Journal of Accounting and Economics*, vol. 12, 1990, pp. 37-44.

McQuaig, Linda. *Behind closed doors,* Penguin Books Canada Limited, Ontario, 1987.

Moonitz, Maurice. *Obtaining agreement on standards*, Studies in Accounting Research No. 8, Sarasota, Florida, American Accounting Association, 1974.

Moore, Giora. "Depreciation, inflation and capital replacement", *Contemporary Accounting Research,* vol. 3, Spring 1987, pp. 375-383.

Padwe, "The death of G.A.A.P. reporting? A tale from the folks who brought you U.S. tax reform", *Current developments in measuring business income for tax purposes: Corporate Management Tax Conference 1987,* Canadian Tax Foundation, Toronto, pp. 11:1-11:13.

Press, Eric G. and Weintrop, Joseph B. "Accounting-based constraints in public and private debt agreements: Their association with leverage and impact on accounting choice." *Journal of Accounting and Economics*, vol. 12, issue 1-3, January 1990, pp. 65-95.

Pross, A. Paul. *Group politics and public policy*, Oxford University Press, Toronto, 1986.

Reed, R. C. "The dilemma of conformity: tax and financial reporting—A perspective from Revenue Canada", *1981 Corporate Management Tax Conference,* Canadian Tax Foundation, Toronto, 1982, pp. 1-21.

Richardson, Stephen R. "Comment: Corporate tax incentives and tax losses", *The economic impacts of tax reform*, edited by Jack Mintz and John Whalley, Canadian Tax Foundation, 1989, pp. 130-136.

Ronen, J. and Aharoni, A. "The choice among accounting alternatives and management compensation: effects of corporate tax", *The Accounting Review,* vol. LXIV, no. 1, January 1989, pp. 69-86.

Rosen, L. S.; and Granof, M. H.. *Canadian financial accounting: Principles and issues*, Prentice-Hall of Canada, Ltd, Scarborough, Ontario, 1980.

Royal Commission on taxation: Report, vols. 2 and 4, Queen's Printer, Ottawa, 1966.

Salyzyn, Vladimir. *Canadian income tax policy: An economic evaluation*, third edition, CCH Canadian Limited, 1986.

Sawatsky, John. *The insiders: government business, and the lobbyists*, McClelland and Stewart, Toronto, 1987.

Siegel, Sidney. *Nonparametric statistics for the behavioral sciences*, McGraw-Hill Book Company, Inc, Japan, 1956.

Skinner, Ross M. *Accounting principles*, Canadian Institute of Chartered Accountants, Toronto, 1972.

Skinner, Ross M. *Accounting standards in evolution*, Holt, Rinehart and Winston of Canada, Limited, Toronto, 1987.

Smith, Roger S. *Tax expenditures,* Canadian Tax Foundation, Toronto, 1979.

Stickney, Clyde P. and McGee, Victor E. "Effective corporate tax rates: The effect of size, capital intensity, leverage, and other factors", *Journal of Accounting and Public Policy*, vol. 1, 1982, pp. 125-152.

Tabachnick, Barbara G. and Fidel, Linda S. *Using multivariate statistics*, Harper & Row, Publishers, New York, 1983.

Thirsk, Wayne R. and Whalley, John. *Tax policy options in the 1980s*, Canadian Tax Paper No. 66, Canadian Tax Foundation, 1982.

Thomas, A. L. *The allocation problem in financial theory: Studies in accounting research no. 3,* American Accounting Association, Evanston, OL, 1969.

Thorburn, Hugh G. *Interest groups in the Canadian federal system*, University of Toronto Press, 1985.

Thornton, Daniel B. "Inflation, accounting and the Canadian corporate tax base." *Canadian Journal of Administrative Sciences*, vol. 4, no. 1, March 1987, pp. 66-96.

Verrecchia, Robert E. "Managerial discretion in the choice among financial reporting alternatives", *Journal of Accounting and Economics*, vol. 8, 1986, pp. 175-195.

Watts, Ross L. and Zimmerman, Jerold L. "Towards a positive theory of the determination of accounting standards", *The Accounting Review,* vol. LIII, no. 1, January 1978, pp. 112-134.

_____ and _____, *Positive accounting theory*, Prentice-Hall, Englewood Cliffs, N. J., 1986.

_____ and _____. "Positive accounting theory: A ten year perspective", *The Accounting Review*, vol. 65, no. 1, January 1990, pp. 131-156.

Wright, F. K. "Towards a general theory of depreciation", *Journal of Accounting Research,* Vol. 2, 1964, pp. 80-90.

Zeff, S. A. "Chronology of significant developments in the establishment of accounting principles in the U.S.—1926-72", *Journal of Accounting Research*, Spring 1972, pp. 217-227.

Zimmerman, J. L. "Taxes and firm size", *Journal of Accounting and Economics*, August 1983, pp. 119-150.

Zmijewski, Mark E. and Hagerman, Robert L. "An income strategy approach to the positive theory of accounting standard setting/choice", *Journal of Accounting and Economics*, vol. 3, 1981, pp. 129-149.

Appendix 1—Positive theory explanatory variables

Common influential variables

SIZE - The 1976 CCA Survey showed that significantly more large firms used straight-line than other methods of depreciation, whereas small firms tend to use tax methods and rates for accounting depreciation. Of corporations using only one depreciation method, 80 percent of large firms used straight-line, and 82 percent of small firms used declining balance with capital cost allowance rates (p. 8). These results are revealing as none of the capital cost allowance provisions and relatively few other tax provisions are affected by the size of the firm.

The 1976 CCA Survey results are inconsistent with the size hypothesis in the positive accounting literature. The size hypothesis assumes that large firms choose accounting procedures that reduce current reported earnings (e.g., declining balance methods). Size is usually measured using total assets and revenue. Hagerman and Zmijewski's (1979) study supports the size hypothesis—the relationship between the size of the firm and its choice of depreciation methods is significant at the .05 level. With the exception of Stickney and McGee's (1982) examination of effective tax rates, all other studies cited support the size hypothesis.

CAPITAL INTENSITY - Hagerman and Zmijewski (1979) concluded that the relationship between a capital intensity variable and the choice of depreciation methods is significant at the .10 level. Capital intensity is also significant in the Zmijewski and Hagerman (1981) portfolio study and in the Stickney and McGee (1982) effective tax rate study. Capital intensity is measured using the ratio of gross or net fixed assets to revenue or total assets. The capital intensity variable may also be significant in discriminating firms that are likely to change their depreciation policy subsequent to tax reform.

Capital intensive firms, especially in the agriculture and manufacturing sector, have benefited greatly from accelerated capital cost allowances and investment tax credits, most of which were introduced in the 1970s and early 1980s to stimulate investment. The tax reform reduction in capital cost allowance rates increases the tax liabilities some capital intensive firms incur.[4] Therefore, these firms have a vested interest in ensuring that the accelerated capital cost allowance that currently exists is not further eroded. One way in which firms might attempt to influence future tax policy changes is to reduce their political visibility by minimizing the difference between their annual accounting depreciation and capital cost allowance claims. One firm is unlikely to influence tax policy, but if many firms change their depreciation policies to minimize excess capital cost allowances, then the aggregate effect will result in a class action.

The reduction of the buffer between capital cost allowance claims and accounting depreciation might also encourage firms to adopt income decreasing depreciation policies to protect the implicit recognition of inflation and foregone interest. While the effect of inflation is officially excluded from the capital cost allowance system, the accelerated capital cost allowance provisions (pre-1987 tax reform) are ad hoc measures to recognize, and more than offset for, these exclusions (Boadway, et al., 1987; Brown, 1986; Department of Finance, *A direction for change*, May 1985). As the buffer gets smaller, firms will factor inflation and the equity cost of capital into their depreciation provisions to ensure that an inflation cushion is maintained.

---

4 In 1985, the overall federal and provincial tax rates were -0.7 percent for agriculture and 6.2 percent for manufacturing and construction (Department of Finance, *A direction for change*, May 1985, p. 15). After 1987 tax reform, agriculture and mining continue to have federal tax burdens that are between 3 and 4 percent lower than the average for all industries. But, by 1991, the manufacturing sector will have an effective federal tax rate of 19.7 percent, which is close to the average rate for all industries of 19.6 percent (Department of Finance, *Tax reform 1987: Income tax reform*, June 1987, p. 43).

LEVERAGE - Highly leveraged firms tend to select income increasing accounting methods to increase the likelihood that restrictive covenants are met. Collins, et al. (1980), Dhaliwal (1980), Holthausen (1980), and Leftwich (1980) concluded that the higher the debt/equity ratio of the firm, the more binding are the debt covenants. With the exception of Holthausen, evidence is provided that the debt/equity ratio is significant in the choice of accounting methods. Highly leveraged firms with a high debt/equity ratio are more likely to choose straight-line depreciation methods.

Debt financed firms are less likely than equity financed firms to change their depreciation policies to minimize the prospect of further capital cost allowance rate changes, for two reasons. First, these highly leveraged firms have lower effective tax rates (Stickney and McGee, 1982), as interest payments are a substantial tax deduction, so they have less incentive to change their depreciation policies because the potential tax benefit is low. That is, their exposure to increases in income taxes on capital investments is less than it is for equity financed firms. Second, in the short run, highly leveraged firms are preoccupied with keeping reported accounting income as high as possible to ensure that debt covenants are met, so they are expected to select income increasing accounting methods.

FIRM CONTROL - Dhaliwal, Salamon and Smith (1982) revealed that management controlled firms are more likely than owner controlled firms to adopt accounting methods that result in increased earnings, specifically straight-line depreciation methods. However, the control variables used were arbitrary and no other important studies have improved the control measure in an accounting method choice study.

MANAGEMENT INCENTIVE PLANS - The impact of earnings-based management incentive plans on accounting method choice has been tested in many studies. Notably,

Healy (1985) showed that a manager's choice of accounting procedures is affected by a bonus plan. Watts and Zimmerman (1978), Hagerman and Zmijewski (1979), and Zmijewski and Hagerman (1981) confirmed the bonus hypothesis.

Most studies have used the bonus plan hypothesis in combination with several other explanatory variables in determining the influences on accounting method choice. With the exception of Healy's study, important details of bonus plans have been ignored in research designs. Also, most of the research on the bonus plan hypothesis has used U.S. firms that are required to report bonus plan detail pursuant to S.E.C. filing requirements. Similar disclosure requirements do not apply to most Canadian firms.

Other influential variables

Variables which are less frequently used, but which were used in some positive theory studies are concentration or industry membership, risk, net monetary assets, and depreciation. Unlike the common variables summarized above, these economic variables are not consistently significant.

CONCENTRATION/INDUSTRY MEMBERSHIP- The relationship between the concentration ratio and the choice of depreciation methods is not significant in the accounting method choice studies surveyed (Hagerman and Zmijewski, 1979; and Zmijewski and Hagerman, 1981). Similarly, Watts and Zimmerman's study showed that being a regulated firm is not significant in determining voting behavior on accounting standard changes. However, Stickney and McGee (1982) and Zimmerman (1983) conclude that industry membership is significant in determining effective income tax rates, but the effects are opposite in the two studies.

RISK - Hagerman and Zmijewski determined that a risk factor, beta of accounting earnings, significantly influences the choice of depreciation policy. Firms with higher systematic risk, on average, have higher accounting returns creating high political

exposure. In addition, high risk firms tend to have greater variability in accounting earnings. To minimize the variability, higher risk firms will choose income decreasing accounting methods.

NET MONETARY ASSETS - Net monetary assets were used in the Watts and Zimmerman (1978) study as a proxy for the impact of general price-level adjustments on earnings. However the variable was not significant in determining voting behavior.

DEPRECIATION - Like net monetary assets, depreciation was used as a proxy for the impact of general price-level adjustments on earnings. Depreciation, also, was not significant in the Watts and Zimmerman (1978) lobbying study.

Appendix 2—Variable labels

Table 19

Independent economic variables for which data is collected

Variable label	Financial information collected and coding, if applicable
METHOD	Depreciation method 0 - SL 1 - combination and other 2 - DB
CHANGE	Depreciation method or rate change 0 - income decreasing 1 - no change 2 - income increasing
ASSETS	Total assets, net of accumulated depreciation
CAPASS	Net capital assets
ACCUM	Accumulated depreciation
LTD	Long term debt—long term portion, only
EQUITY	Shareholders' equity, including share capital and retained earnings
REV	Gross revenue
DEPN	Depreciation expense
INC	Net income before income taxes and extraordinary items
DEFTAX	Deferred tax expense
FACTOR	Percentage of deferred taxes related to excess of CCA over accounting depreciation

Appendix 3—Financial data

Data for ALL firms in sample

in alphabetic order by name of company

Company name	Depreciation change D-decrease N-none I-increase	Total assets	Net capital assets	Accumulated depreciation	Total revenue	Net income before taxes	Deferred tax expense
A & W Food Services	I	20651	8576	6569	38159	2312	164
A.B. Chance Co	D	7510	1099	1432	10303	980	8
AE Autoclave of Canada	N	1038	4	7	1079	-26	
AEG Bayly Inc	N	4260	1132	2865	6764	-1732	
AHA Automobile Techn	D	3850	190	145	3769	674	212
ASL Atlantic Searoute	D	14987	12296	128	13896	778	410
Ace-Atlantic Container	I	5954	3379	2003	20108	-676	
Acer, McLernon Cantel	I	8041	1481	4213	20242	167	75
Ada Outerwear Inc	N	5904	102	45	14556	185	
Adason Properties Ltd	N	2164	121	68	1511	-130	
Aerovox Canada Ltd	I	3848	1117	1055	8426	803	-20
Affiliated Trading Can	N	3651	31	35	10581	128	
Agro Company of Can	D	41124	34	219	515674	5638	
Agropur	N	196485	151944	72231	721411	6017	349
Air Canada	I	2512614	1999436	1275854	2517458	5629	-15564
Air-King Limited	N	7893	734	1221	12175	1659	-30
Airport Chevrolet Olds	N	6760	215	45	22321	150	-203
Aitken Motors Ltd	N	2519	584	230	10935	232	11
Ajawak Investments	I	2992	186	59	1093	37	9
Albany Int'l Can	D	46407	17875	13698	43790	6551	307
Albis Canada	I	9924	3181	1296	23576	100	-20
Alexander & Alexander	D	2127	148	121	914	97	14
Alfa-Laval Limited	D	22918	3258	3180	38018	1222	77
Algoma Central Railway	N	309761	263224	128551	170804	13978	7369
Algonquin Mercantile	D	90236	13832	12539	216447	4313	-247
All-Way Transportation	D	5423	2312	1452	15807	97	-72
Allegheny Int'l	D	24369	2047	2637	24365	4232	-173
Alliance Ro-Na Home In	D	42036	1		618335	1	
Allied Van Lines	N	2521	394	451	2756	117	
Alpine Electronics	N	5400	148	63	13715	711	
American Biltrite (Can	N	20979	5838	10319	32265	1706	-157
American Hoist	N	14396	3497	1172	14210	1980	
Amherst Industries	D	6611	2001	2543	10914	550	
Amtelecom Groups	N	12462	10743	5723	6608	1271	72
Andres Wines	I	41651	10907	10287	54444	9881	22
Andrew Antenna Co	N	17630	5316	4924	22318	972	31
Angel-Etts Inc	N	3208	228	117	12130	897	
Anglo-Cdn Telephone	N	3284	2947	1305	1492	58	6
Angostura Int'l Ltd	N	3291	557	357	5200	230	

Armstrong World Ind	D	31357	8773	17564	46280	2516	-100
Aro Canada Ltd	N	6500	1006	829	8660	969	-7
Artic Transp'n. Ltd	I	96319	91433	22619	38600	6807	3289
Artopex Int'l	D	10200	1366	3150	25870	1409	286
Asea Inc	I	108443	17130	13669	99554	545	-102
Ashworth Bros. Canada	N	470	63	93	722	34	6
Associated Grocers	D	51908	25116	7353	192905	-691	-282
Associated Industrial	N	6057	110	166	12091	1274	
Asten Canada	I	11470	1306	3027	13841	3484	111
Astra Pharmaceutical	N	17737	7252	1550	29465	7057	205
Atco Ltd	I	2882057	2030791	525790	1610339	221647	-7670
Atelco	N	4969	694	458	11324	1707	12
Atkemix Inc	I	16482	1074	2183	40249	5459	-20
Atlas Copco Can	N	29954	3472	2788	54635	3204	109
Aurora Engineering	N	3896	378	302	7452	332	23
Austin Company	N	407	24	191	1346	-621	
Autocrown Corp'n	N	1699	852	986	2860	-63	
Automation Industries	D	8492	1503	1143	14453	1628	8
Autrex Inc	D	9441	180	273	20098	764	
Avdel Inc	N	1786	64	118	3318	610	3
Avery Label Systems In	N	12983	5340	2839	25664	4236	39
Avinda Video	I	2329	167	22	920	-233	
Avon Canada	N	34771	6823	8001	95029	5888	-31
BC Rail	D	1259019	1063135	195668	149732	2585	1343
BC Sugar Refinery	N	150637	17642	59844	145407	17541	694
BCE Development	N	1182013	898252	11306	453634	10177	5325
BCE Inc	N	17486000	11655600	5732800	10578700	1867900	161900
BG Checo Int'l. Ltd	I	31476	3756	12374	108253	161	64
Bagatelle Canada	N	5899	148	177	15642	114	
Banister Continental	I	87025	32326	33262	106236	-149	471
Bar 5 Seminental Stk	N	5337	1170	82	1544	-117	-51
Basf Canada	D	90265	23509	67894	248621	5896	
Baton Broadcasting	N	113248	45317	35825	154569	27592	2434
Bearing Supply Ltd	I	8219	1797	888	22565	-382	
Beaver Construction	D	19790	5236	9451	51592	1917	867
Bechtel Canada Ltd	I	10932	969	966	42953	-3024	
Becker Milk Co	N	64180	38927	30843	257226	10854	-98
Beecham Canada	D	39091	6080	3544	48443	-1052	1027
Beecham Laboratories	I	3884	973	926	8663	341	31
Bell Canada	N	511375400	9618200	4592200	5290600	1144100	83300
Beneficial Canada	N	391985	1576	4689	82766	17515	691
Bennett Dunlop Ford	D	4398	365	243	21720	248	
Betonag Ltee	D	9607	5972	2966	9056	1715	-36
Betz Inc	I	11723	5352	3763	21078	5313	-108
Beutel, Goodman & Co	I	13789	504	274	16718	7834	131
Black & Decker Canada	N	121114	32967	24462	159438	4910	495
Blackstone Industrial	I	29243	6096	17831	66012	9232	87
Blue Giant Group	I	6364	330	644	9859	265	
Bombardier Inc	N	427243	124322	110263	515478	16833	3171
Bonar Inc	I	67242	24157	32389	127271	8399	96
Budd Canada Inc	N	148456	52354	54807	272544	42240	-1199
CAE Industries	N	276054	56702	47884	327012	40436	4078
CCL Industries	D	379465	160732	38660	607320	49536	14985
C-I-L Inc	N	1156308	574906	409173	1176025	73462	20315
CKR Inc. & Subsid	N	101230	37748	30257	216115	618	2089
Campbell Soup Co	N	130920	38083	55137	321521	21993	321
Campeau Corp'n	N	2036487	696183	39994	211192	50450	23280
Canada Malting Co	I	118308	50833	48770	166499	10225	-1464
Canada Packers	N	596311	219908	194379	3293527	42914	4052
Canadian Marconi	N	261695	28598	31241	313925	241987	180

Canadian Pacific	D	17601949	12429589	5752360	13086000	76621	-115501
Canam Manac	I	113861	21602	12669	203832	10943	3074
Canfor Corp'n	N	893975	435872	424835	1029532	-29393	1204
Carling O'Keefe	I	449656	244482	139978	954978	87645	9744
Cascades	D	195915	87412	20491	266272	26193	1636
Cdn. Tire Corp'n	D	1233735	406706	153146	2108594	87481	-603
Cincom Systems	N	2075	377	195	5325	-1484	
Cinram Ltd	I	7063	4569	4286	14486	1327	515
Consoltex Canada	D	89189	19517	25288	129902	4266	599
Crestbrook Forest Ind	N	114006	52378	59536	137944	1472	266
Culinar Inc	I	171293	85545	37284	220585	20057	82
Dalmys	N	52238	19743	15576	111074	-4295	-66
Dofasco Inc	D	2204277	1174327	917117	1926172	284505	-14900
Doman Industries	N	186831	48055	24217	187867	-15343	-2902
Domco Industries	N	55922	12045	23750	100540	10541	1511
Dominion Textile	N	685618	271276	266896	877846	43803	13435
Donohue Inc	N	671054	352316	154960	447959	66745	8447
Dontar Inc	N	1521400	854700	716400	2044300	128400	29900
Dupont	N	666866	222691	378498	1170597	63936	1729
Dylex Limited	N	445719	42527	17276	926676	66054	-2991
Electrohome Limited	I	79668	23146	30800	134832	2762	-232
Emco Limited	I	252902	71612	36076	428202	9469	-925
Empire Company Ltd	N	449654	232633	43481	908935	16286	2532
Finning Tractor	I	381881	56495	45341	452985	23089	130
Ford of Canada	N	2762500	670200	675000	12122000	537000	
Frank W. Horner Inc	N	22272	3328	4013	33345	4329	29
Gendis Inc	N	249267	73347	59168	521652	45886	2445
General Electric	N	1089011	237773	282151	1642350	113161	-6051
Gesco Industries	D	38323	1722	4034	106079	2160	
Goodyear Canada Inc	N	343971	92229	170921	632466	-2440	2883
Gord Anderson Pontiac	N	3798	849	155	11916	124	4246
Grafton Group Ltd	I	240562	44087	35569	461954	39162	739
HL Blanchford	I	10196	3826	7394	17875	1102	-7
Haley Industries	N	29338	13367	6435	26642	5217	-330
Halifax Dev. Ltd	I	118362	92973	9456	24717	650	182
Hamilton Motor Prod	N	4367	94	240	18215	94	20
Hammerson Canada	N	566906	472621	13093	52708	4503	
Harland Pontiac	N	5103	370	235	37615	779	-15
Harris Steel Group	N	104102	28002	18142	172351	3874	1291
Harris Steel Grp	I	141197	57407	20546	284387	16506	2740
Hartfield Chieftain Le	D	6230	6109	3815	3289	418	-103
Hartz Holdings	D	16289	2675	3872	33083	2571	42
Harvey's Travel	N	2004	795	423	3059	-65	-28
Hastings Inc	D	6090	820	1038	10031	542	-11
Hawker Siddeley	N	389243	190656	172064	411514	35797	2249
Hawker Siddeley Diesel	N	6507	119	198	10007	293	695
Hawker Siddeley Motors	N	6067	984	301	9132	892	
Hawkesbury G & C Club	N	663	617	258	592	-8	1
Hayes-Dana Inc	N	190351	56000	72313	371191	34370	-566
Hayes-Dana Inc	N	221997	72902	80416	444786	27415	1204
Helix Circuits	D	32555	12849	6372	38541	7330	675
Henleys Group	D	205953	28309	6918	386845	13965	151
Herbalife	D	1237	173	82	18045	403	
Hewitt Equipment	I	109821	3859	20128	127640	2490	-607
Hewlett Packard	N	152218	25307	13943	260643	20111	1332
Hilton Canada Inc	N	65199	40790	12307	47272	-2850	-900
Hitachi Denshi	N	6071	59	107	11705	336	-21
Hitachi (HSC)	N	57428	654	736	173350	3638	-660
Hoffmann-La Roche	D	50472	14876	9657	67786	578	
Hofmann Balancing	N	1664	136	169	4032	662	-5

Hoke Controls	I	2134	44	104	4072	48	
Hollinger Inc	I	807691	132724	91110	1146479	-43769	-6821
Honda Canada	N	283810	23948	3252	798476	79574	
Hornet Pitfield	N	58883	23516	14353	404519	10246	21
Horton CBI	N	19709	12243	11674	14306	-3240	-8
Howden Group Canada	N	72665	16238	14187	57749	7869	-395
ICG Corp	D	1690778	1006395	318904	940821	57494	13962
Imasco	D	2741572	867618	375746	4353254	365424	18568
Independent Tractor	N	3766	608	369	5952	479	
Inglis Limited	N	132607	54680	21812	286880	14422	1740
Innopac Inc	I	113976	43003	27098	146248	13172	2916
Int'l. Thomson	D	1350000	355000	158000	1763000	176000	22000
Ipco	N	6807	2410	3437	213334	3067	
Ipsco Inc	D	391646	208828	57669	280241	21785	4326
Ivaco Inc	N	1117329	437453	304867	1193935	54423	6504
JA Henckels Zwillingsw	N	5321	736	164	3503	1982	
JJ Baker Co	N	5211	1425	3231	10981	1039	
Jannock Limited	I	216925	66955	62331	218889	6491	2119
John Labatt	N	1185594	418216	291074	2449489	148483	1838
Leon's Furniture	N	59479	15390	15358	146099	7298	-173
MacMillan Bloedel	N	2320200	1093900	956800	2335400	27300	-8700
Maclean Hunter	N	814685	430343	164766	902656	98506	12321
Magna Int'l	I	645408	374683	80738	690400	69430	15450
Marathon Realty	N	1276366	1066625	82873	267280	46663	17424
Marks Work Warehouse	I	25325	5455	2222	81674	3048	-568
Mitel Corp'n	N	573100	223300	84800	370800	-29600	1200
Molsons	D	1033902	406912	283618	1871842	66023	12832
Monarch Investments	N	97178	36391	2476	88250	8077	-1207
NL Chem Canada	I	81725	14526	25947	86214	21893	158
NTN Bearing Corp	D	20514	4357	8815	31077	3221	1525
National Sea Products	I	276450	118568	86233	404964	-8248	-1934
Nat'l. Bank of Can	D	19250081	248121	107260	2043249	158236	
Niagara Fruit & Veg	N	514	131	204	3834	-25	
Nichimen Canada	N	4124	23	81	15395	-75	
Nikon Canada	N	9939	176	165	15577	320	
Nissan Automobile	N	103824	14396	6027	434475	30826	
Nissho Iwai Canada	N	26429	318430	244007	174909	-648	
Nitrochem Inc	N	46678	18490	6740	73518	-2914	
No-Sag Spring	N	8315	1616	2127	15874	1418	-38
Nokia Products Limited	N	3758	396	37	6529	114	1
Noma	N	82045	19975	10593	156201	19150	721
Norcape Development	N	18133	17140	992	2587	441	220
Noritake Canada	N	6656	253	348	9879	120	
Normick Perron Inc	N	133051	55740	24241	130753	4632	1816
Norsat	I	12200	566	629	16058	-8216	
North American Lumber	N	15140	1171	4755	18993	236	-19
North American Van Lin	I	16650	2970	3743	40770	2580	85
North American Watch	N	4149	82	34	3868	221	
North York Chevrolet	N	15237	433	648	47227	833	
Northern Telecom	N	4059700	1145300	781700	4378600	491000	81300
Northgate Pontiac Buic	N	5035	1099	567	13544	181	19
Northway Mercury Sales	N	4934	162	129	13265	163	17
Northwest Drug	I	19320	2521	1311	71508	1649	-31
Northwest Sports Enter	N	21712	7478	693	13321	584	192
Norwick Perron	N	124465	55735	27400	127634	-4551	-1670
Nova Steel	N	14237	5406	598	26341	568	127
Novatrust Prop	N	5602	5378	417	875	-24	-12
Numasi Corporation	N	3735	2847	687	2779	801	-11
Nurse Chevrolet	I	4367	477	531	27033	317	13
Nutrite Inc	N	46030	4014	6493	74113	1005	-45

OE Inc	N	42278	1691	574	121119	7606	
Oshawa Group	D	435631	161759	104105	2434985	45538	-238
PCL	N	65703	25288	8928	133771	-289	-74
PWA	I	434495	288812	83172	332148	22074	
Peerless Carpet Corp	N	89212	19924	24427	136458	-7691	-2684
Phillips Cables Ltd	N	100376	29720	41686	180712	-2895	-122
Quaker Oats	N	103224	28091	17946	201422	16273	862
Quebecor	I	140787	63934	23117	278931	17694	6304
Redpath Industries	N	210595	50601	47349	395194	39335	3852
Reitmans	I	128636	24325	18602	293811	22068	-236
Robin Hood Multi Foods	D	118168	31380	24814	345290	22377	1043
Rogers Communications	D	1110175	608573	317380	411016	-17234	-2764
Rolland Inc	N	97127	30703	43354	284448	11077	373
Rothmans Inc	D	675387	285887	189576	885478	117647	10909
Royal Bank	D	88002708	946817	528431	9017594	623980	23969
SHL Systemhouse	D	21764	4788	3545	50289	8982	3200
SNC Group	D	114666	28392	22205	206077	8877	32
Scott Hospitality	D	510820	394303	133247	588858	51529	11256
Scott Paper	N	186782	127898	63013	216370	14950	5800
Seagrams	N	5595872	696016	348447	2821245	157559	35742
Sears Canada	D	2125644	357372	286017	3440744	35807	-8180
Silcorp	N	121406	50391	31102	479162	4762	20
Sintra	D	59126	21286	51572	138839	5788	-24
Slater Steel Ind	D	169727	53345	53163	163834	2843	-1678
Southam	I	716532	308203	183175	1084329	78472	5043
Spar Aerospace	N	138709	24515	19697	190031	24876	1456
Steinbergs	D	1012954	467048	301173	3452275	30081	5565
Stelco	N	2802940	1484350	1362213	2426659	46629	-16627
Tembec Inc	I	141137	87403	22417	107069	1312	154
Textron	I	78340	8474	7207	112130	10722	100
The Hamilton Group	D	44059	2117	643	29679	5118	385
The North Shore	N	20307	20228	1007	2373	-1022	
Thomson Newspaper	N	1198205	380457	193247	954146	307890	34203
Toronto Star	N	483781	61682	53016	619441	34620	6383
Toronto Sun	N	266795	183340	31797	322087	21238	1870
Trans Canada Glass	I	60258	19736	13049	116275	6917	30
Trimac Limited	D	370302	234754	123983	330297	8047	3223
UGG	N	388537	122692	75813	1279965	17983	4555
Unicorp Canada	D	479851	270738	18025	111559	25258	3553
Union Carbide	D	884716	452500	336338	691363	-745	-6400
United Westburn	N	358050	35344	21888	913594	1271	-4058
VS Services	N	80005	21631	30793	281176	10146	-247
Variety Corp/Massey	N	1449200	195200	358100	1468600	10700	-600
Wajax	N	159087	21275	12777	230978	9500	
Weldwood	I	342077	140464	143157	5572348	-12460	-7569
Weston, Geo Ltd	N	2279000	1134000	766300	8262700	173700	14900
Woodwards	D	558581	269974	211830	1120016	3601	-445
Zerox Canada Inc	N	653923	80426	71069	752817	106860	7358

Data for ALL firms in sample

in order of largest to smallest by total assets

Company name	Depreciation change D-decrease N-none I-increase	Total assets	Net capital assets	Accumulated depreciation	Total revenue	Net income before taxes	Deferred tax expense
Bell Canada	N	511375400	9618200	4592200	5290600	1144100	83300
Royal Bank	D	88002708	946817	528431	9017594	623980	23969
Nat'l. Bank of Can	D	19250081	248121	107260	2043249	158236	
Canadian Pacific	D	17601949	12429589	5752360	13086000	76621	-115501
BCE Inc	N	17486000	11655600	5732800	10578700	1867900	161900
Seagrams	N	5595872	696016	348447	2821245	157559	35742
Northern Telecom	N	4059700	1145300	781700	4378600	491000	81300
Atco Ltd	I	2882057	2030791	525790	1610339	221647	-7670
Stelco	N	2802940	1484350	1362213	2426659	46629	-16627
Ford of Canada	N	2762500	670200	675000	12122000	537000	
Imasco	D	2741572	867618	375746	4353254	365424	18568
Air Canada	I	2512614	1999436	1275854	2517458	5629	-15564
MacMillan Bloedel	N	2320200	1093900	956800	2335400	27300	-8700
Weston, Geo Ltd	N	2279000	1134000	766300	8262700	173700	14900
Dofasco Inc	D	2204277	1174327	917117	1926172	284505	-14900
Sears Canada	D	2125644	357372	286017	3440744	35807	-8180
Campeau Corp'n	N	2036487	696183	39994	211192	50450	23280
ICG Corp	D	1690778	1006395	318904	940821	57494	13962
Dontar Inc	N	1521400	854700	716400	2044300	128400	29900
Variety Corp/Massey	N	1449200	195200	358100	1468600	10700	-600
Int'l. Thomson	D	1350000	355000	158000	1763000	176000	22000
Marathon Realty	N	1276366	1066625	82873	267280	46663	17424
BC Rail	D	1259019	1063135	195668	149732	2585	1343
Cdn. Tire Corp'n	D	1233735	406706	153146	2108594	87481	-603
Thomson Newspaper	N	1198205	380457	193247	954146	307890	34203
John Labatt	N	1185594	418216	291074	2449489	148483	1838
BCE Development	N	1182013	898252	11306	453634	10177	5325
C-I-L Inc	N	1156308	574906	409173	1176025	73462	20315
Ivaco Inc	N	1117329	437453	304867	1193935	54423	6504
Rogers Communications	D	1110175	608573	317380	411016	-17234	-2764
General Electric	N	1089011	237773	282151	1642350	113161	-6051
Molsons	D	1033902	406912	283618	1871842	66023	12832
Steinbergs	D	1012954	467048	301173	3452275	30081	5565
Canfor Corp'n	N	893975	435872	424835	1029532	-29393	1204
Union Carbide	D	884716	452500	336338	691363	-745	-6400
Maclean Hunter	N	814685	430343	164766	902656	98506	12321
Hollinger Inc	I	807691	132724	91110	1146479	-43769	-6821
Southam	I	716532	308203	183175	1084329	78472	5043
Dominion Textile	N	685618	271276	266896	877846	43803	13435
Rothmans Inc	D	675387	285887	189576	885478	117647	10909
Donohue Inc	N	671054	352316	154960	447959	66745	8447
Dupont	N	666866	222691	378498	1170597	63936	1729
Zerox Canada Inc	N	653923	80426	71069	752817	106860	7358

Magna Int'l	I	645408	374683	80738	690400	69430	15450
Canada Packers	N	596311	219908	194379	3293527	42914	4052
Mitel Corp'n	N	573100	223300	84800	370800	-29600	1200
Hammerson Canada	N	566906	472621	13093	52708	4503	
Woodwards	D	558581	269974	211830	1120016	3601	-445
Scott Hospitality	D	510820	394303	133247	588858	51529	11256
Toronto Star	N	483781	61682	53016	619441	34620	6383
Unicorp Canada	D	479851	270738	18025	111559	25258	3553
Carling O'Keefe	I	449656	244482	139978	954978	87645	9744
Empire Company Ltd	N	449654	232633	43481	908935	16286	2532
Dylex Limited	N	445719	42527	17276	926676	66054	-2991
Oshawa Group	D	435631	161759	104105	2434985	45538	-238
PWA	I	434495	288812	83172	332148	22074	
Bombardier Inc	N	427243	124322	110263	515478	16833	3171
Beneficial Canada	N	391985	1576	4689	82766	17515	691
Ipsco Inc	D	391646	208828	57669	280241	21785	4326
Hawker Siddeley	N	389243	190656	172064	411514	35797	2249
UGG	N	388537	122692	75813	1279965	17983	4555
Finning Tractor	I	381881	56495	45341	452985	23089	130
CCL Industries	D	379465	160732	38660	607320	49536	14985
Trimac Limited	D	370302	234754	123983	330297	8047	3223
United Westburn	N	358050	35344	21888	913594	1271	-4058
Goodyear Canada Inc	N	343971	92229	170921	632466	-2440	2883
Weldwood	I	342077	140464	143157	5572348	-12460	-7569
Algoma Central Railwa	N	309761	263224	128551	170804	13978	7369
Honda Canada	N	283810	23948	3252	798476	79574	
National Sea Products	I	276450	118568	86233	404964	-8248	-1934
CAE Industries.	N	276054	56702	47884	327012	40436	4078
Toronto Sun	N	266795	183340	31797	322087	21238	1870
Canadian Marconi	N	261695	28598	31241	313925	241987	180
Emco Limited	I	252902	71612	36076	428202	9469	-925
Gendis Inc	N	249267	73347	59168	521652	45886	2445
Grafton Group Ltd	I	240562	44087	35569	461954	39162	739
Hayes-Dana Inc	N	221997	72902	80416	444786	27415	1204
Jannock Limited	I	216925	66955	62331	218889	6491	2119
Redpath Industries	N	210595	50601	47349	395194	39335	3852
Henleys Group	D	205953	28309	6918	386845	13965	151
Agropur	N	196485	151944	72231	721411	6017	349
Cascades	D	195915	87412	20491	266272	26193	1636
Hayes-Dana Inc	N	190351	56000	72313	371191	34370	-566
Doman Industries	N	186831	48055	24217	187867	-15343	-2902
Scott Paper	N	186782	127898	63013	216370	14950	5800
Culinar Inc	I	171293	85545	37284	220585	20057	82
Slater Steel Ind	D	169727	53345	53163	163834	2843	-1678
Wajax	N	159087	21275	12777	230978	9500	
Hewlett Packard	N	152218	25307	13943	260643	20111	1332
BC Sugar Refinery	N	150637	17642	59844	145407	17541	694
Budd Canada Inc	N	148456	52354	54807	272544	42240	-1199
Harris Steel Grp	I	141197	57407	20546	284387	16506	2740
Tembec Inc	I	141137	87403	22417	107069	1312	154
Quebecor	I	140787	63934	23117	278931	17694	6304
Spar Aerospace	N	138709	24515	19697	190031	24876	1456
Normick Perron Inc	N	133051	55740	24241	130753	4632	1816
Inglis Limited	N	132607	54680	21812	286880	14422	1740
Campbell Soup Co	N	130920	38083	55137	321521	21993	321
Reitmans	I	128636	24325	18602	293811	22068	-236
Norwick Perron	N	124465	55735	27400	127634	-4551	-1670
Silcorp	N	121406	50391	31102	479162	4762	20
Black & Decker Canada	N	121114	32967	24462	159438	4910	495
Halifax Dev. Ltd	I	118362	92973	9456	24717	650	182

Canada Malting Co	I	118308	50833	48770	166499	10225	-1464
Robin Hood Multi Food	D	118168	31380	24814	345290	22377	1043
SNC Group	D	114666	28392	22205	206077	8877	32
Crestbrook Forest Ind	N	114006	52378	59536	137944	1472	266
Innopac Inc	I	113976	43003	27098	146248	13172	2916
Canam Manac	I	113861	21602	12669	203832	10943	3074
Baton Broadcasting	N	113248	45317	35825	154569	27592	2434
Hewitt Equipment	I	109821	3859	20128	127640	2490	-607
Asea Inc	I	108443	17130	13669	99554	545	-102
Harris Steel Group	N	104102	28002	18142	172351	3874	1291
Nissan Automobile	N	103824	14396	6027	434475	30826	
Quaker Oats	N	103224	28091	17946	201422	16273	862
CKR Inc. & Subsid	N	101230	37748	30257	216115	618	2089
Phillips Cables Ltd	N	100376	29720	41686	180712	-2895	-122
Monarch Investments	N	97178	36391	2476	88250	8077	-1207
Rolland Inc	N	97127	30703	43354	284448	11077	373
Artic Transp'n. Ltd	I	96319	91433	22619	38600	6807	3289
Basf Canada	D	90265	23509	67894	248621	5896	
Algonquin Mercantile	D	90236	13832	12539	216447	4313	-247
Peerless Carpet Corp	N	89212	19924	24427	136458	-7691	-2684
Consoltex Canada	D	89189	19517	25288	129902	4266	599
Banister Continental	I	87025	32326	33262	106236	-149	471
Noma	N	82045	19975	10593	156201	19150	721
NL Chem Canada	I	81725	14526	25947	86214	21893	158
VS Services	N	80005	21631	30793	281176	10146	-247
Electrohome Limited	I	79668	23146	30800	134832	2762	-232
Textron	I	78340	8474	7207	112130	10722	100
Howden Group Canada	N	72665	16238	14187	57749	7869	-395
Bonar Inc	I	67242	24157	32389	127271	8399	96
PCL	N	65703	25288	8928	133771	-289	-74
Hilton Canada Inc	N	65199	40790	12307	47272	-2850	-900
Becker Milk Co	N	64180	38927	30843	257226	10854	-98
Trans Canada Glass	I	60258	19736	13049	116275	6917	30
Leon's Furniture	N	59479	15390	15358	146099	7298	-173
Sintra	D	59126	21286	51572	138839	5788	-24
Hornet Pitfield	N	58883	23516	14353	404519	10246	21
Hitachi (HSC)	N	57428	654	736	173350	3638	-660
Domco Industries	N	55922	12045	23750	100540	10541	1511
Dalmys	N	52238	19743	15576	111074	-4295	-66
Associated Grocers	D	51908	25116	7353	192905	-691	-282
Hoffmann-La Roche	D	50472	14876	9657	67786	578	
Nitrochem Inc	N	46678	18490	6740	73518	-2914	
Albany Int'l Can	D	46407	17875	13698	43790	6551	307
Nutrite Inc	N	46030	4014	6493	74113	1005	-45
The Hamilton Group	D	44059	2117	643	29679	5118	385
OE Inc	N	42278	1691	574	121119	7606	
Alliance Ro-Na Home	D	42036	1		618335	1	
Andres Wines	I	41651	10907	10287	54444	9881	22
Agro Company of Can	D	41124	34	219	515674	5638	
Beecham Canada	D	39091	6080	3544	48443	-1052	1027
Gesco Industries	D	38323	1722	4034	106079	2160	
Avon Canada	N	34771	6823	8001	95029	5888	-31
Helix Circuits	D	32555	12849	6372	38541	7330	675
BG Checo Int'l. Ltd	I	31476	3756	12374	108253	161	64
Armstrong World Ind	D	31357	8773	17564	46280	2516	-100
Atlas Copco Can	N	29954	3472	2788	54635	3204	109
Haley Industries	N	29338	13367	6435	26642	5217	-330
Blackstone Industrial	I	29243	6096	17831	66012	9232	87
Nissho Iwai Canada	N	26429	318430	244007	174909	-648	
Marks Work Warehouse	I	25325	5455	2222	81674	3048	-568

Allegheny Int'l	D	24369	2047	2637	24365	4232	-173
Alfa-Laval Limited	D	22918	3258	3180	38018	1222	77
Frank W. Horner Inc	N	22272	3328	4013	33345	4329	29
SHL Systemhouse	D	21764	4788	3545	50289	8982	3200
Northwest Sports Ente	N	21712	7478	693	13321	584	192
American Biltrite (Ca	N	20979	5838	10319	32265	1706	-157
A & W Food Services	I	20651	8576	6569	38159	2312	164
NTN Bearing Corp	D	20514	4357	8815	31077	3221	1525
The North Shore	N	20307	20228	1007	2373	-1022	
Beaver Construction	D	19790	5236	9451	51592	1917	867
Horton CBI	N	19709	12243	11674	14306	-3240	-8
Northwest Drug	I	19320	2521	1311	71508	1649	-31
Norcape Development	N	18133	17140	992	2587	441	220
Astra Pharmaceutical	N	17737	7252	1550	29465	7057	205
Andrew Antenna Co	N	17630	5316	4924	22318	972	31
North American Van Li	I	16650	2970	3743	40770	2580	85
Atkemix Inc	I	16482	1074	2183	40249	5459	-20
Hartz Holdings	D	16289	2675	3872	33083	2571	42
North York Chevrolet	N	15237	433	648	47227	833	
North American Lumber	N	15140	1171	4755	18993	236	-19
ASL Atlantic Searoute	D	14987	12296	128	13896	778	410
American Hoist	N	14396	3497	1172	14210	1980	
Nova Steel	N	14237	5406	598	26341	568	127
Beutel, Goodman & Co	I	13789	504	274	16718	7834	131
Avery Label Systems	N	12983	5340	2839	25664	4236	39
Amtelecom Groups	N	12462	10743	5723	6608	1271	72
Norsat	I	12200	566	629	16058	-8216	
Betz Inc	I	11723	5352	3763	21078	5313	-108
Asten Canada	I	11470	1306	3027	13841	3484	111
Bechtel Canada Ltd	I	10932	969	966	42953	-3024	
Artopex Int'l	D	10200	1366	3150	25870	1409	286
HL Blanchford	I	10196	3826	7394	17875	1102	-7
Nikon Canada	N	9939	176	165	15577	320	
Albis Canada	I	9924	3181	1296	23576	100	-20
Betonag Ltee	D	9607	5972	2966	9056	1715	-36
Autrex Inc	D	9441	180	273	20098	764	
Automation Industries	D	8492	1503	1143	14453	1628	8
No-Sag Spring	N	8315	1616	2127	15874	1418	-38
Bearing Supply Ltd	I	8219	1797	888	22565	-382	
Acer, McLernon Cantel	I	8041	1481	4213	20242	167	75
Air-King Limited	N	7893	734	1221	12175	1659	-30
A.B. Chance Co	D	7510	1099	1432	10303	980	8
Cinram Ltd	I	7063	4569	4286	14486	1327	515
Ipco	N	6807	2410	3437	213334	3067	
Airport Chevrolet Old	N	6760	215	45	22321	150	-203
Noritake Canada	N	6656	253	348	9879	120	
Amherst Industries	D	6611	2001	2543	10914	550	
Hawker Siddeley Diese	N	6507	119	198	10007	293	695
Aro Canada Ltd	N	6500	1006	829	8660	969	-7
Blue Giant Group	I	6364	330	644	9859	265	
Hartfield Chieftain L	D	6230	6109	3815	3289	418	-103
Hastings Inc	D	6090	820	1038	10031	542	-11
Hitachi Denshi	N	6071	59	107	11705	336	-21
Hawker Siddeley Motor	N	6067	984	301	9132	892	
Associated Industrial	N	6057	110	166	12091	1274	
Ace-Atlantic Containe	I	5954	3379	2003	20108	-676	
Ada Outerwear Inc	N	5904	102	45	14556	185	
Bagatelle Canada	N	5899	148	177	15642	114	
Novatrust Prop	N	5602	5378	417	875	-24	-12
All-Way Transportatio	D	5423	2312	1452	15807	97	-72

Alpine Electronics	N	5400	148	63	13715	711	
Bar 5 Seminental Stk	N	5337	1170	82	1544	-117	-51
JA Henckels Zwillings	N	5321	736	164	3503	1982	
JJ Baker Co	N	5211	1425	3231	10981	1039	
Harland Pontiac	N	5103	370	235	37615	779	-15
Northgate Pontiac Bui	N	5035	1099	567	13544	181	19
Atelco	N	4969	694	458	11324	1707	12
Northway Mercury Sale	N	4934	162	129	13265	163	17
Bennett Dunlop Ford	D	4398	365	243	21720	248	
Nurse Chevrolet	I	4367	477	531	27033	317	13
Hamilton Motor Prod	N	4367	94	240	18215	94	20
AEG Bayly Inc	N	4260	1132	2865	6764	-1732	
North American Watch	N	4149	82	34	3868	221	
Nichimen Canada	N	4124	23	81	15395	-75	
Aurora Engineering	N	3896	378	302	7452	332	23
Beecham Laboratories	I	3884	973	926	8663	341	31
AHA Automobile Techn	D	3850	190	145	3769	674	212
Aerovox Canada Ltd	I	3848	1117	1055	8426	803	-20
Gord Anderson Pontiac	N	3798	849	155	11916	124	4246
Independent Tractor	N	3766	608	369	5952	479	
Nokia Products Limite	N	3758	396	37	6529	114	1
Numasi Corporation	N	3735	2847	687	2779	801	-11
Affiliated Trading Ca	N	3651	31	35	10581	128	
Angostura Int'l Ltd	N	3291	557	357	5200	230	
Anglo-Cdn Telephone	N	3284	2947	1305	1492	58	6
Angel-Etts Inc	N	3208	228	117	12130	897	
Ajawak Investments	I	2992	186	59	1093	37	9
Allied Van Lines	N	2521	394	451	2756	117	
Aitken Motors Ltd	N	2519	584	230	10935	232	11
Avinda Video	I	2329	167	22	920	-233	
Adason Properties Ltd	N	2164	121	68	1511	-130	
Hoke Controls	I	2134	44	104	4072	48	
Alexander & Alexander	D	2127	148	121	914	97	14
Cincom Systems	N	2075	377	195	5325	-1484	
Harvey's Travel	N	2004	795	423	3059	-65	-28
Avdel Inc	N	1786	64	118	3318	610	3
Autocrown Corp'n	N	1699	852	986	2860	-63	
Hofmann Balancing	N	1664	136	169	4032	662	-5
Herbalife	D	1237	173	82	18045	403	
AE Autoclave of Canad	N	1038	4	7	1079	-26	
Hawkesbury G & C Club	N	663	617	258	592	-8	1
Niagara Fruit & Veg	N	514	131	204	3834	-25	
Ashworth Bros. Canada	N	470	63	93	722	34	6
Austin Company	N	407	24	191	1346	-621	

Data for CHANGE firms in sample

in order of largest to smallest by total assets

Company name	Depreciation change D-decrease N-none I-increase	Total assets	Net capital assets	Accumulated depreciation	Total revenue	Net income before taxes	Deferred tax expense
Royal Bank	D	88002708	946817	528431	9017594	623980	23969
Nat'l. Bank of Can	D	19250081	248121	107260	2043249	158236	
Canadian Pacific	D	17601949	12429589	5752360	13086000	76621	-115501
Atco Ltd	I	2882057	2030791	525790	1610339	221647	-7670
Imasco	D	2741572	867618	375746	4353254	365424	18568
Air Canada	I	2512614	1999436	1275854	2517458	5629	-15564
Dofasco Inc	D	2204277	1174327	917117	1926172	284505	-14900
Sears Canada	D	2125644	357372	286017	3440744	35807	-8180
ICG Corp	D	1690778	1006395	318904	940821	57494	13962
Int'l. Thomson	D	1350000	355000	158000	1763000	176000	22000
BC Rail	D	1259019	1063135	195668	149732	2585	1343
Cdn. Tire Corp'n	D	1233735	406706	153146	2108594	87481	-603
Rogers Communications	D	1110175	608573	317380	411016	-17234	-2764
Molsons	D	1033902	406912	283618	1871842	66023	12832
Steinbergs	D	1012954	467048	301173	3452275	30081	5565
Union Carbide	D	884716	452500	336338	691363	-745	-6400
Hollinger Inc	I	807691	132724	91110	1146479	-43769	-6821
Southam	I	716532	308203	183175	1084329	78472	5043
Rothmans Inc	D	675387	285887	189576	885478	117647	10909
Magna Int'l	I	645408	374683	80738	690400	69430	15450
Woodwards	D	558581	269974	211830	1120016	3601	-445
Scott Hospitality	D	510820	394303	133247	588858	51529	11256
Unicorp Canada	D	479851	270738	18025	111559	25258	3553
Carling O'Keefe	I	449656	244482	139978	954978	87645	9744
Oshawa Group	D	435631	161759	104105	2434985	45538	-238
PWA	I	434495	288812	83172	332148	22074	
Ipsco Inc	D	391646	208828	57669	280241	21785	4326
Finning Tractor	I	381881	56495	45341	452985	23089	130
CCL Industries	D	379465	160732	38660	607320	49536	14985
Trimac Limited	D	370302	234754	123983	330297	8047	3223
Weldwood	I	342077	140464	143157	5572348	-12460	-7569
National Sea Products	I	276450	118568	86233	404964	-8248	-1934
Emco Limited	I	252902	71612	36076	428202	9469	-925
Grafton Group Ltd	I	240562	44087	35569	461954	39162	739
Jannock Limited	I	216925	66955	62331	218889	6491	2119
Henleys Group	D	205953	28309	6918	386845	13965	151
Cascades	D	195915	87412	20491	266272	26193	1636
Culinar Inc	I	171293	85545	37284	220585	20057	82
Slater Steel Ind	D	169727	53345	53163	163834	2843	-1678
Harris Steel Grp	I	141197	57407	20546	284387	16506	2740
Tembec Inc	I	141137	87403	22417	107069	1312	154
Quebecor	I	140787	63934	23117	278931	17694	6304
Reitmans	I	128636	24325	18602	293811	22068	-236

Halifax Dev. Ltd	I	118362	92973	9456	24717	650	182
Canada Malting Co	I	118308	50833	48770	166499	10225	-1464
Robin Hood Multi Foods	D	118168	31380	24814	345290	22377	1043
SNC Group	D	114666	28392	22205	206077	8877	32
Innopac Inc	I	113976	43003	27098	146248	13172	2916
Canam Manac	I	113861	21602	12669	203832	10943	3074
Hewitt Equipment	I	109821	3859	20128	127640	2490	-607
Asea Inc	I	108443	17130	13669	99554	545	-102
Artic Transp'n. Ltd	I	96319	91433	22619	38600	6807	3289
Basf Canada	D	90265	23509	67894	248621	5896	
Algonquin Mercantile	D	90236	13832	12539	216447	4313	-247
Consoltex Canada	D	89189	19517	25288	129902	4266	599
Banister Continental	I	87025	32326	33262	106236	-149	471
NL Chem Canada	I	81725	14526	25947	86214	21893	158
Electrohome Limited	I	79668	23146	30800	134832	2762	-232
Textron	I	78340	8474	7207	112130	10722	100
Bonar Inc	I	67242	24157	32389	127271	8399	96
Trans Canada Glass	I	60258	19736	13049	116275	6917	30
Sintra	D	59126	21286	51572	138839	5788	-24
Associated Grocers	D	51908	25116	7353	192905	-691	-282
Hoffmann-La Roche	D	50472	14876	9657	67786	578	
Albany Int'l Can	D	46407	17875	13698	43790	6551	307
The Hamilton Group	D	44059	2117	643	29679	5118	385
Alliance Ro-Na Home In	D	42036	1		618335	1	
Andres Wines	I	41651	10907	10287	54444	9881	22
Agro Company of Can	D	41124	34	219	515674	5638	
Beecham Canada	D	39091	6080	3544	48443	-1052	1027
Gesco Industries	D	38323	1722	4034	106079	2160	
Helix Circuits	D	32555	12849	6372	38541	7330	675
BG Checo Int'l. Ltd	I	31476	3756	12374	108253	161	64
Armstrong World Ind	D	31357	8773	17564	46280	2516	-100
Blackstone Industrial	I	29243	6096	17831	66012	9232	87
Marks Work Warehouse	I	25325	5455	2222	81674	3048	-568
Allegheny Int'l	D	24369	2047	2637	24365	4232	-173
Alfa-Laval Limited	D	22918	3258	3180	38018	1222	77
SHL Systemhouse	D	21764	4788	3545	50289	8982	3200
A & W Food Services	I	20651	8576	6569	38159	2312	164
NTN Bearing Corp	D	20514	4357	8815	31077	3221	1525
Beaver Construction	D	19790	5236	9451	51592	1917	867
Northwest Drug	I	19320	2521	1311	71508	1649	-31
North American Van Lin	I	16650	2970	3743	40770	2580	85
Atkemix Inc	I	16482	1074	2183	40249	5459	-20
Hartz Holdings	D	16289	2675	3872	33083	2571	42
ASL Atlantic Searoute	D	14987	12296	128	13896	778	410
Beutel, Goodman & Co	I	13789	504	274	16718	7834	131
Norsat	I	12200	566	629	16058	-8216	
Betz Inc	I	11723	5352	3763	21078	5313	-108
Asten Canada	I	11470	1306	3027	13841	3484	111
Bechtel Canada Ltd	I	10932	969	966	42953	-3024	
Artopex Int'l	D	10200	1366	3150	25870	1409	286
HL Blanchford	I	10196	3826	7394	17875	1102	-7
Albis Canada	I	9924	3181	1296	23576	100	-20
Betonag Ltee	D	9607	5972	2966	9056	1715	-36
Autrex Inc	D	9441	180	273	20098	764	
Automation Industries	D	8492	1503	1143	14453	1628	8
Bearing Supply Ltd	I	8219	1797	888	22565	-382	
Acer, McLernon Cantel	I	8041	1481	4213	20242	167	75
A.B. Chance Co	D	7510	1099	1432	10303	980	8
Cinram Ltd	I	7063	4569	4286	14486	1327	515
Amherst Industries	D	6611	2001	2543	10914	550	

Blue Giant Group	I	6364	330	644	9859	265	
Hartfield Chieftain Le	D	6230	6109	3815	3289	418	-103
Hastings Inc	D	6090	820	1038	10031	542	-11
Ace-Atlantic Container	I	5954	3379	2003	20108	-676	
All-Way Transportation	D	5423	2312	1452	15807	97	-72
Bennett Dunlop Ford	D	4398	365	243	21720	248	
Nurse Chevrolet	I	4367	477	531	27033	317	13
Beecham Laboratories	I	3884	973	926	8663	341	31
AHA Automobile Techn	D	3850	190	145	3769	674	212
Aerovox Canada Ltd	I	3848	1117	1055	8426	803	-20
Ajawak Investments	I	2992	186	59	1093	37	9
Avinda Video	I	2329	167	22	920	-233	
Hoke Controls	I	2134	44	104	4072	48	
Alexander & Alexander	D	2127	148	121	914	97	14
Herbalife	D	1237	173	82	18045	403	

Data for NO CHANGE firms in sample

in order of largest to smallest by total assets

Company name	Depreciation change N-none	Total assets	Net capital assets	Accumulated depreciation	Total revenue	Net income before taxes	Deferred tax expense
Bell Canada	N	511375400	9618200	4592200	5290600	1144100	83300
BCE Inc	N	17486000	11655600	5732800	10578700	1867900	161900
Seagrams	N	5595872	696016	348447	2821245	157559	35742
Northern Telecom	N	4059700	1145300	781700	4378600	491000	81300
Stelco	N	2802940	1484350	1362213	2426659	46629	-16627
Ford of Canada	N	2762500	670200	675000	12122000	537000	
MacMillan Bloedel	N	2320200	1093900	956800	2335400	27300	-8700
Weston, Geo Ltd	N	2279000	1134000	766300	8262700	173700	14900
Campeau Corp'n	N	2036487	696183	39994	211192	50450	23280
Dontar Inc	N	1521400	854700	716400	2044300	128400	29900
Variety Corp/Massey	N	1449200	195200	358100	1468600	10700	-600
Marathon Realty	N	1276366	1066625	82873	267280	46663	17424
Thomson Newspaper	N	1198205	380457	193247	954146	307890	34203
John Labatt	N	1185594	418216	291074	2449489	148483	1838
BCE Development	N	1182013	898252	11306	453634	10177	5325
C-I-L Inc	N	1156308	574906	409173	1176025	73462	20315
Ivaco Inc	N	1117329	437453	304867	1193935	54423	6504
General Electric	N	1089011	237773	282151	1642350	113161	-6051
Canfor Corp'n	N	893975	435872	424835	1029532	-29393	1204
Maclean Hunter	N	814685	430343	164766	902656	98506	12321
Dominion Textile	N	685618	271276	266896	877846	43803	13435
Donohue Inc	N	671054	352316	154960	447959	66745	8447
Dupont	N	666866	222691	378498	1170597	63936	1729
Zerox Canada Inc	N	653923	80426	71069	752817	106860	7358
Canada Packers	N	596311	219908	194379	3293527	42914	4052
Mitel Corp'n	N	573100	223300	84800	370800	-29600	1200
Hammerson Canada	N	566906	472621	13093	52708	4503	
Toronto Star	N	483781	61682	53016	619441	34620	6383
Empire Company Ltd	N	449654	232633	43481	908935	16286	2532
Dylex Limited	N	445719	42527	17276	926676	66054	-2991
Bombardier Inc	N	427243	124322	110263	515478	16833	3171
Beneficial Canada	N	391985	1576	4689	82766	17515	691
Hawker Siddeley	N	389243	190656	172064	411514	35797	2249
UGG	N	388537	122692	75813	1279965	17983	4555
United Westburn	N	358050	35344	21888	913594	1271	-4058
Goodyear Canada Inc	N	343971	92229	170921	632466	-2440	2883
Algoma Central Railway	N	309761	263224	128551	170804	13978	7369
Honda Canada	N	283810	23948	3252	798476	79574	
CAE Industries	N	276054	56702	47884	327012	40436	4078
Toronto Sun	N	266795	183340	31797	322087	21238	1870
Canadian Marconi	N	261695	28598	31241	313925	241987	180
Gendis Inc	N	249267	73347	59168	521652	45886	2445
Hayes-Dana Inc	N	221997	72902	80416	444786	27415	1204
Redpath Industries	N	210595	50601	47349	395194	39335	3852

Agropur	N	196485	151944	72231	721411	6017	349
Hayes-Dana Inc	N	190351	56000	72313	371191	34370	-566
Doman Industries	N	186831	48055	24217	187867	-15343	-2902
Scott Paper	N	186782	127898	63013	216370	14950	5800
Wajax	N	159087	21275	12777	230978	9500	
Hewlett Packard	N	152218	25307	13943	260643	20111	1332
BC Sugar Refinery	N	150637	17642	59844	145407	17541	694
Budd Canada Inc	N	148456	52354	54807	272544	42240	-1199
Spar Aerospace	N	138709	24515	19697	190031	24876	1456
Normick Perron Inc	N	133051	55740	24241	130753	4632	1816
Inglis Limited	N	132607	54680	21812	286880	14422	1740
Campbell Soup Co	N	130920	38083	55137	321521	21993	321
Norwick Perron	N	124465	55735	27400	127634	-4551	-1670
Silcorp	N	121406	50391	31102	479162	4762	20
Black & Decker Canada	N	121114	32967	24462	159438	4910	495
Crestbrook Forest Ind	N	114006	52378	59536	137944	1472	266
Baton Broadcasting	N	113248	45317	35825	154569	27592	2434
Harris Steel Group	N	104102	28002	18142	172351	3874	1291
Nissan Automobile	N	103824	14396	6027	434475	30826	
Quaker Oats	N	103224	28091	17946	201422	16273	862
CKR Inc. & Subsid	N	101230	37748	30257	216115	618	2089
Phillips Cables Ltd	N	100376	29720	41686	180712	-2895	-122
Monarch Investments	N	97178	36391	2476	88250	8077	-1207
Rolland Inc	N	97127	30703	43354	284448	11077	373
Peerless Carpet Corp	N	89212	19924	24427	136458	-7691	-2684
Noma	N	82045	19975	10593	156201	19150	721
VS Services	N	80005	21631	30793	281176	10146	-247
Howden Group Canada	N	72665	16238	14187	57749	7869	-395
PCL	N	65703	25288	8928	133771	-289	-74
Hilton Canada Inc	N	65199	40790	12307	47272	-2850	-900
Becker Milk Co	N	64180	38927	30843	257226	10854	-98
Leon's Furniture	N	59479	15390	15358	146099	7298	-173
Hornet Pitfield	N	58883	23516	14353	404519	10246	21
Hitachi (HSC)	N	57428	654	736	173350	3638	-660
Domco Industries	N	55922	12045	23750	100540	10541	1511
Dalmys	N	52238	19743	15576	111074	-4295	-66
Nitrochem Inc	N	46678	18490	6740	73518	-2914	
Nutrite Inc	N	46030	4014	6493	74113	1005	-45
OE Inc	N	42278	1691	574	121119	7606	
Avon Canada	N	34771	6823	8001	95029	5888	-31
Atlas Copco Can	N	29954	3472	2788	54635	3204	109
Haley Industries	N	29338	13367	6435	26642	5217	-330
Nissho Iwai Canada	N	26429	318430	244007	174909	-648	
Frank W. Horner Inc	N	22272	3328	4013	33345	4329	29
Northwest Sports Enter	N	21712	7478	693	13321	584	192
American Biltrite (Can	N	20979	5838	10319	32265	1706	-157
The North Shore	N	20307	20228	1007	2373	-1022	
Horton CBI	N	19709	12243	11674	14306	-3240	-8
Norcape Development	N	18133	17140	992	2587	441	220
Astra Pharmaceutical	N	17737	7252	1550	29465	7057	205
Andrew Antenna Co	N	17630	5316	4924	22318	972	31
North York Chevrolet	N	15237	433	648	47227	833	
North American Lumber	N	15140	1171	4755	18993	236	-19
American Hoist	N	14396	3497	1172	14210	1980	
Nova Steel	N	14237	5406	598	26341	568	127
Avery Label Systems In	N	12983	5340	2839	25664	4236	39
Amtelecom Groups	N	12462	10743	5723	6608	1271	72
Nikon Canada	N	9939	176	165	15577	320	
No-Sag Spring	N	8315	1616	2127	15874	1418	-38
Air-King Limited	N	7893	734	1221	12175	1659	-30

Ipco	N	6807	2410	3437	213334	3067	
Airport Chevrolet Olds	N	6760	215	45	22321	150	-203
Noritake Canada	N	6656	253	348	9879	120	
Hawker Siddeley Diesel	N	6507	119	198	10007	293	695
Aro Canada Ltd	N	6500	1006	829	8660	969	-7
Hitachi Denshi	N	6071	59	107	11705	336	-21
Hawker Siddeley Motors	N	6067	984	301	9132	892	
Associated Industrial	N	6057	110	166	12091	1274	
Ada Outerwear Inc	N	5904	102	45	14556	185	
Bagatelle Canada	N	5899	148	177	15642	114	
Novatrust Prop	N	5602	5378	417	875	-24	-12
Alpine Electronics	N	5400	148	63	13715	711	
Bar 5 Seminental Stk	N	5337	1170	82	1544	-117	-51
JA Henckels Zwillingsw	N	5321	736	164	3503	1982	
JJ Baker Co	N	5211	1425	3231	10981	1039	
Harland Pontiac	N	5103	370	235	37615	779	-15
Northgate Pontiac Buic	N	5035	1099	567	13544	181	19
Atelco	N	4969	694	458	11324	1707	12
Northway Mercury Sales	N	4934	162	129	13265	163	17
Hamilton Motor Prod	N	4367	94	240	18215	94	20
AEG Bayly Inc	N	4260	1132	2865	6764	-1732	
North American Watch	N	4149	82	34	3868	221	
Nichimen Canada	N	4124	23	81	15395	-75	
Aurora Engineering	N	3896	378	302	7452	332	23
Gord Anderson Pontiac	N	3798	849	155	11916	124	4246
Independent Tractor	N	3766	608	369	5952	479	
Nokia Products Limited	N	3758	396	37	6529	114	1
Numasi Corporation	N	3735	2847	687	2779	801	-11
Affiliated Trading Can	N	3651	31	35	10581	128	
Angostura Int'l Ltd	N	3291	557	357	5200	230	
Anglo-Cdn Telephone	N	3284	2947	1305	1492	58	6
Angel-Etts Inc	N	3208	228	117	12130	897	
Allied Van Lines	N	2521	394	451	2756	117	
Aitken Motors Ltd	N	2519	584	230	10935	232	11
Adason Properties Ltd	N	2164	121	68	1511	-130	
Cincom Systems	N	2075	377	195	5325	-1484	
Harvey's Travel	N	2004	795	423	3059	-65	-28
Avdel Inc	N	1786	64	118	3318	610	3
Autocrown Corp'n	N	1699	852	986	2860	-63	
Hofmann Balancing	N	1664	136	169	4032	662	-5
AE Autoclave of Canada	N	1038	4	7	1079	-26	
Hawkesbury G & C Club	N	663	617	258	592	-8	1
Niagara Fruit & Veg	N	514	131	204	3834	-25	
Ashworth Bros. Canada	N	470	63	93	722	34	6
Austin Company	N	407	24	191	1346	-621	

Appendix 4—Histograms

Total assets

Reduced

Count	Midpoint	One symbol equals approximately 8.0 occurrences
227	458786	**********
16	1375435	**
7	2292084	*
2	3208733	
1	4125382	*Northern Telecom*
0	5042031	
1	5958680	*Seagrams*
	:	
	:	
0	17875117	
1	18791766	*National Bank of Canada*

```
I.....+.....I.....+.....I.....+.....I.....+.....I.....+.....I
0       80       160       240       320       400
        Histogram frequency
```

Mean: 396464.753 Std Dev: 1360451.87 Min: 470.0 Max: 19250081.0

Total assets - Original

254	2381405	**********
1	7143288	
0	11905171	
2	16667054	
1	21428937	
	:	
	:	
0	78571533	
0	83333416	
1	88095299	*Royal Bank*
0	92857182	
1	97619065	*Bell Canada*

Mean: 1257506.42 Std Dev: 8443943.12 Min: 470.0 Max: 511375400.0

Total capital assets

Reduced

Count	Midpoint	One symbol equals approximately 4.0 occurrences
192	77976	**********
15	233943	****
9	389910	**
15	545877	****
6	701844	**
4	857811	*
2	1013778	*
2	1169745	*
2	1325712	*
0	1481679	
1	1637646	
0	1793613	
2	1949580	*
2	2105547	*
0	2261514	
0	2417481	
1	2573448	*Atco*
0	2729415	
1	2885382	*Stelco*
0	3041349	
1	3197316	*Air Canada*

```
I.....+.....I.....+.....I.....+.....I.....+.....I.....+.....I
0        40        80        120       160       200
        Histogram frequency
```

Mean: 211379.0031 Std Dev: 459820.304 Min: 1.0 Max: 3275290.0

Total capital assets - Original

239	432895	**********
11	1298703	*
5	2164511	*
2	3030319	
	:	
	:	
1	14285823	*Bell Canada*
0	15151631	
0	16017439	
0	16883247	
2	17749055	*Canadian Pacific and BCE Inc.*

Mean: 409626.346 Std Dev: 1822566.43 Min: 1.0 Max: 18181949.0

Gross revenue

Reduced

Count	Midpoint	One symbol equals approximately 4.0 occurrences
189	197306	**********
26	590740	*******
16	984174	****
3	1377608	*
5	1771042	*
4	2164476	*
4	2557910	*
1	2951344	
3	3344778	*
0	3738212	
0	4131646	
2	4525080	* *Northern Telecom and Imasco*
0	4918514	
0	5311948	
1	5705382	*Goodyear Canada Ltd.*
	:	
	:	
	:	
1	8065986	*Weston, Geo. Ltd.*

```
I.....+.....I.....+.....I.....+.....I.....+.....I.....+.....I
0       40       80       120      160      200
        Histogram frequency
```

Mean: 444865.400 Std Dev: 929575.301 Min: 592.0 Max: 8262700.0

Gross revenue - Original

210	312146	**********
22	935261	***
5	1558376	*
9	2181491	*
2	2804606	
3	3427721	
1	4050836	
1	4673951	
2	5297066	
	:	
	:	
	:	
1	8412641	*Weston, Geo. Ltd*
1	9035756	*Royal Bank*
0	9658871	
1	10281986	*BCE Inc.*
0	10905101	
0	11528216	
1	12151331	*Ford*
1	12774446	*Canadian Pacific*

Mean: 628982.965 Std Dev: 1651594.96 Min: 592.0 Max: 13086000.0

Net income before taxes

Reduced

Count	Midpoint	One symbol equals approximately 4.0 occurrences
3	-31044	*
150	-5578	**********
56	19888	**********
20	45354	*****
8	70820	**
4	96286	*
3	121752	*
3	147218	*
2	172684	*
0	198150	
1	223616	
1	249082	
1	274548	
1	300014	*Thomson Newspaper*
0	325480	
0	350946	
1	376412	*Imasco*
	:	
	:	
1	478276	*Northern Telecom*

```
I.....+.....I.....+.....I.....+.....I.....+.....I.....+.....I
0       40       80       120      160      200
        Histogram frequency
```

Mean: 22857.545 Std Dev: 57454.190 Min: -43769.0 Max: 491000.0

Net income before taxes - Original

147	-18925	**********
81	30779	**********
13	80483	***
5	130187	*
4	179891	*
2	229595	*
1	279299	
1	329003	
1	378707	
0	428411	
1	478115	*Northern Telecom*
1	527819	*Ford of Canada*
0	577523	
1	627227	*Royal Bank*
	:	
	:	
2	975155	* *BCE Inc. and Bell Canada*

Mean: 34870.281 Std Dev: 113544.549 Min: -43769.0 Max: 999999.0

Deferred tax expense

Reduced

Count	Midpoint	One symbol equals approximately 4.0 occurrences
3	-14303	*
4	-9639	*
8	-4975	**
190	-311	**********
28	4353	*******
6	9017	**
7	13681	**
3	18345	*
2	23009	*
1	27673	
1	32337	
1	37001	*Thomson Newspaper*
	:	
	:	
1	78977	*Northern Telecom*

```
I.....+.....I.....+.....I.....+.....I.....+.....I.....+.....I
0       40      80      120     160     200
        Histogram frequency
```

Mean: 1754.459 Std Dev: 7648.335 Min: -16627.0 Max: 81300.0

Deferred tax expense - Original

1	-95240	*Canadian Pacific*
	:	
	:	
3	-19048	
7	-9524	*
217	0	**********
17	9524	**
8	19048	*
2	28572	
2	38096	
	:	
	:	
2	85716	*Northern Telecom*
1	95240	*BCE Inc.*

Mean: 2133.292 Std Dev: 12730.186 Min: -99999.0 Max: 99999.0

Shareholders equity

Reduced

Count	Midpoint	One symbol equals approximately 4.0 occurrences
199	73400	**********
26	220039	*******
12	366678	***
6	513317	**
3	659956	*
2	806595	*
1	953234	
2	1099873	*
0	1246512	
1	1393151	
1	1539790	*Stelco*
0	1686429	
1	1833068	*Northern Telecom*
	:	
	:	
1	3006180	*Seagrams*

```
I.....+.....I.....+.....I.....+.....I.....+.....I.....+.....I
0       40       80       120      160      200
          Histogram frequency
```

Mean: 128440.843 Std Dev: 302487.643 Min: 82.0 Max: 3079497.0

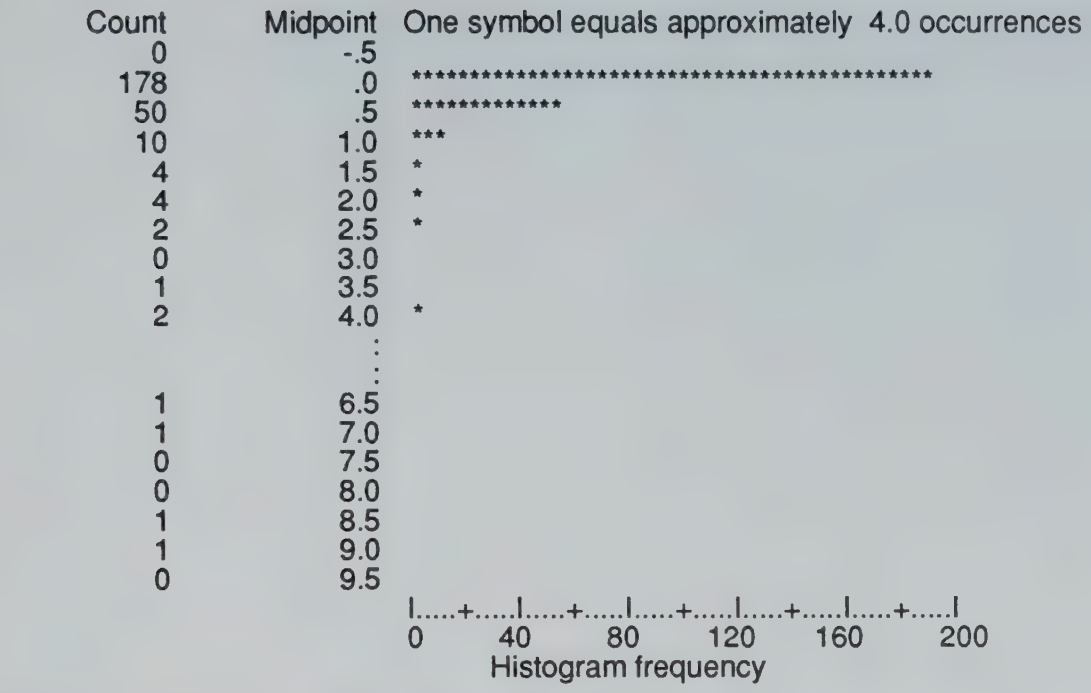
Shareholders equity - Original

231	159461	**********
14	478239	**
4	797017	*
3	1115795	
2	1434573	
1	1753351	
	:	
	:	
1	3028463	
0	3347241	
1	3666019	*Royal Bank*
1	3984797	*Canadian Pacific*
0	4303575	
1	4622353	*Bell Canada*
	:	
	:	
1	6535021	*BCE Inc.*

Mean: 203674.696 Std Dev: 665985.391 Min: 82.0 Max: 6694400.0

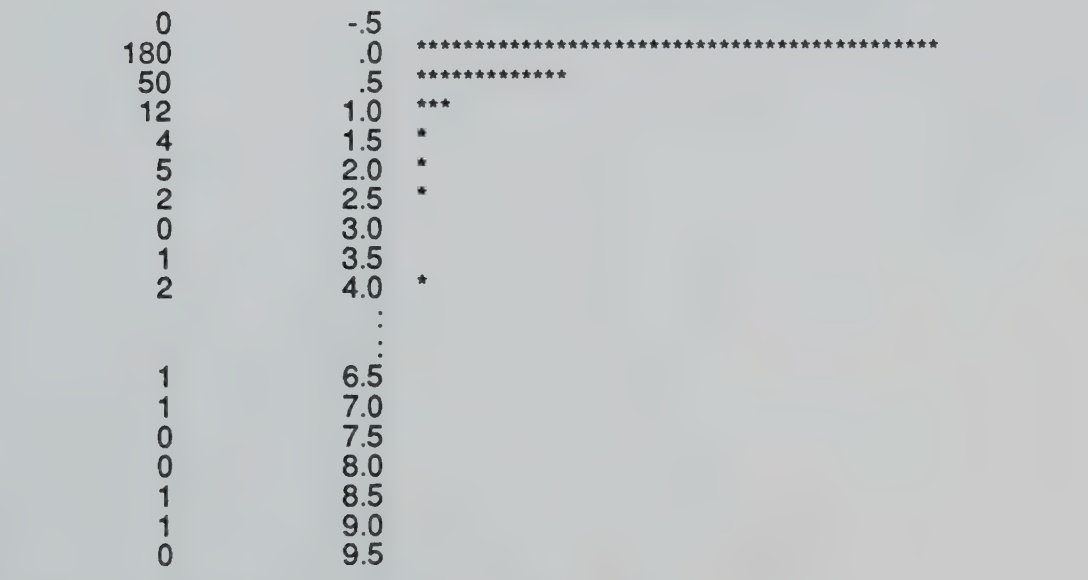
Capital Intensity (Revenue)

Reduced



Mean: .427 Std Dev: 1.0081 Min: .0 Max: 8.967

Capital Intensity (revenue) - Original

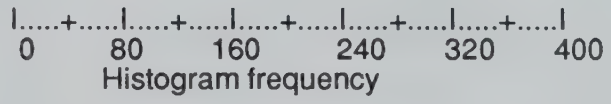


Mean: .434 Std Dev: 1.0076 Min: .0 Max: 8.967

Total debt/equity

Reduced

Count	Midpoint	One symbol equals approximately 8.0 occurrences
1	-1.67	
201	1.67	*************************
30	5.00	****
8	8.33	*
5	11.67	*
2	15.00	
1	18.33	
1	21.67	
1	25.00	
0	28.33	
1	31.67	
0	35.00	
0	38.33	
2	41.67	
0	45.00	
0	48.33	
1	51.67	
0	55.00	
1	61.67	
0	65.00	



Mean: 3.264 Std Dev: 7.0044 Min: .00 Max: 63.301

Total debt/equity - Original

1	-1.67	
203	1.67	*************************
31	5.00	****
8	8.33	*
5	11.67	*
2	15.00	
1	18.33	
3	21.67	
1	25.00	
0	28.33	
1	31.67	
0	35.00	
0	38.33	
2	41.67	
0	45.00	
0	48.33	
1	51.67	
0	55.00	
1	61.67	

Mean: 3.392 Std Dev: 7.157 Min: .0 Max: 63.301

Appendix 5—Univariate statistics

Table 20

Univariate statistics for continuous variables in sample

Variable	Mean	Minimum	Maximum	Standard deviation	Skewness
ASSETS	396,465	470	19,250,081	1,360,452	10.993
ACCUM	76,958	0	1,362,213	180,303	4.330
CAPASS	134,421	1	2,030,791	296,163	3.646
CAP/REV	.427	0	8.97	1.081	5.722
LTDE	1.197	0	60.98	4.520	10.194
DEFTAX	1,754	-16,627	81,300	7,648	5.549
DEPN	11,223	0	233,200	26,192	4.652
EQUITY	128,441	82	3,079,497	302,488	5.599
INC	22,858	-43,769	491,000	57,454	4.588
TD/TA	.570	0	.98	.220	-0.216
LTD	94,170	0	1,761,688	241,122	4.214
NIB4TD	34,081	-21,448	724,200	77,441	4.766
REV	444,865	592	8,262,700	929,575	4.360
TCAPASS	211,379	1.0	3,275,290	459,820	3.753
TCAP/ASS	.603	0	21.28	1.341	14.540
TCAP/REV	.600	0	9.22	1.187	5.113
TDE	3.264	0	63.30	7.044	5.597

Appendix 6—Significant variables in full models

Table 21
Significant variables from discriminant functions of full models for each scenario

	Method change				Method used	
Scenario —>	1	2	3	4	5	6
Significant independent variables	Income increase v. Income decrease	Method change v. No method change	Income. increase v. Other	Income decrease v. Other	SL v. DB	DB v. Other methods
Continuous variables						
ACCUM		X				
ASSETS		X		X		X
CAP/REV		X			X	
LTDE				X	X	X
DEFTAX	X	X	X			
DEPN		X				
EQUITY	X				X	X
LTD		X				
REV					X	
TCAPASS		X				
TCAP/REV						X
D/TA			X			
TDE	X			X	X	X
Categorical variables						
CHANGE					X	X
METHOD	X	X		X		

There are six continuous variables that are significant in more than one of the scenarios. These are: ASSETS (total assets), CAP/REV (net capital assets/gross revenue), LTDE

(long-term debt/shareholders' equity), DEFTAX (deferred tax expense), EQUITY (total shareholders' equity), and TDE (total debt/shareholders' equity). These six significant continuous variables are considered for use in a custom model to be used for the discriminant analysis. Next, the correlations among these variables were reviewed to select common continuous variables that are not highly correlated. A correlation matrix for all significant variables is included as Appendix 7. From a review of the correlations among the variables, LTDE is eliminated because it is highly correlated with TDE (.7114). TDE is retained because it is significant in more of the scenarios.

The variables selected for inclusion in the custom model are:

1. ASSETS
2. EQUITY
3. CAP/REV
4. TDE
5. DEFTAX

Appendix 7—Correlation matrix

Table 22
Pearson correlation coefficients for significant variables

	ACCUM	ASSETS	CAP/REV	DEPN	DEFTAX	EQUITY
ACCUM	1.0000					
ASSETS	.3914	1.000				
CAP/REV	.0492	.0498	1.0000			
DEPN	.8836	.4163	.0378	1.0000		
DEFTAX	.1682	.2252	.0534	.4189	1.0000	
EQUITY	.7000	.5913	.0526	.7094	.4898	1.0000
TD/TA	.0571	.1412	.1873	.0698	.0151	-.0198
LTD	.5781	.7295	.2391	.5761	.2115	.5490
LTDE	-.0179	.0148	.3979	-.0119	-.0053	-.0438
REV	.6744	.4401	-.0553	.7251	.3248	.6612
TCAPASS	.9422	.4317	.1969	.8781	.2332	.6892
TCAP/ASS	.1384	-.0152	.1696	.0379	-.0066	.0031
TCAP/REV	.0975	.0542	.9891	.0692	.0459	.0709
TDE	-.0625	.1046	.2140	-.0564	-.0423	-.0713

	TD/TA	LTD	LTDE	REV	TCAPASS	TCAP/ASS	TCAP/REV	TDE
TD/TA	1.0000							
LTD	.2461	1.0000						
LTDE	.3262	.1280	1.0000					
REV	.0657	.4729	-.0401	1.0000				
TCAPASS	.1213	.7256	.0233	.6528	1.0000			
TCAP/ASS	.0518	.0152	.0137	.0217	.1333	1.0000		
TCAP/REV	.1676	.2501	.3722	-.0505	.2352	.2455	1.0000	
TDE	.5407	.0969	.7114	-.0535	-.0286	-.0207	.1827	1.0000

Appendix 8—Method scenarios

Four groups of firms were identified for the analysis of firms that changed depreciation methods in the period from 1984 to 1988. This appendix presents a similar analysis for two scenarios of firms that use different depreciation methods. These scenarios compare firms that use the following depreciation methods in 1984:

Scenario 5 - straight-line and declining balance

Scenario 6 - "other" and declining balance

Table 23 outlines all scenarios considered in this study.

Table 1

Grouping of firms for discriminant analysis

Scenario number	Dichotomous dependent variable groupings (number of firms in brackets)	
Change	Group 0	Group 1
1.	Income decreasing method change (59)	Income increasing method change (55)
2.	No change in method (141)	Change in method (114)
3.	No change and income decreasing change (200)	Income increasing method change (55)
4.	Income decreasing method change (59)	No change and income increasing change (196)
Method		
5.	Straight-line (SL) (128)	Declining balance (DB) (83)
6.	Other depreciation methods (all methods except DB) (172)	Declining balance (DB) (83)

The analyses of scenarios 5 and 6 are similar to previous positive accounting theory studies in identifying variables that can be used to explain and predict firm choice of depreciation methods.

Scenario 5—Discriminant functions for firms using straight-line and declining balance depreciation methods

Six custom selected variables are used in the analysis of straight-line and declining balance firms, including ASSETS, EQUITY, DEFTAX, TDE, and CAP/REV that were also used in the depreciation change analyses. For the categorical variable, CHANGE is used as an independent variable instead of METHOD, since METHOD is the dependent variable.

First, the function coefficients, and their related significance, are reported. This is followed by summary information and an analysis of the results.

Table 2

Discriminant function analysis of firms

using straight-line and declining balance depreciation methods

Significant variables in custom model		Function coefficients (C_{jp}) SL	DB	Significance of Wilk's Lambda
Continuous variables	CAP/REV	.723	.343	.0000
	EQUITY (mil)	2.379	.999	.0009
	TDE	.098	.181	.0000
Categorical variables	CHANGE	2.342	2.709	.0000
Sample size (N)		128	83	
Group means		.300	-.464	
Canonical correlation			.3512	
Chi-square and the significance level			27.246	.0000

The above discriminant functions reveal that firms with high CAP/REV and EQUITY are more likely to use the straight-line depreciation methods. That is, large,

equity-financed firms are likely to use straight-line depreciation methods, whereas, firms with high TDE are inclined to use declining balance methods. This is inconsistent with the debt/equity hypothesis.

Firms that have an income increasing CHANGE are more likely to use declining balance depreciation and firms that have an income decreasing CHANGE are more likely to use straight-line depreciation. This simply demonstrates that a change in depreciation methods affects income in the manner suggested earlier.

It is interesting to note that ASSETS and DEFTAX are not included. The exclusion of ASSETS is inconsistent with the size hypothesis. The exclusion of DEFTAX simply implies that tax exposure is not an influential variable in the choice of depreciation methods, yet it appears to significantly influence firms that change depreciation methods (scenario 1).

In discriminating straight-line and declining balance firms, the custom model results in a canonical correlation of .35 and a Chi-square of 27.25, which is significant at the .0000 level. Therefore, .35 of the variation among "other" firms is explained by this discriminant function.

Scenario 6—Analysis of firms using "other" (excluding DB) and declining balance depreciation methods

Scenario 6 is very similar to scenario 5. In scenario 6, firms that use different depreciation methods are grouped with straight-line firms to form an "other" group of firms to contrast with firms that use declining balance methods. Declining balance methods are used as a proxy for tax depreciation methods. As in the analysis of scenario 5, pre-1985 depreciation information for all firms in the sample is used. The inclusion of all other firms increases the number by 44, for a total of 172 "other" depreciation method firms, and the number of declining balance firms remains at 83.

There are minor differences in the results of scenario 5 and 6, but, for the most part, the analyses are the same. Table 25 outlines the discriminant functions and summary statistics for scenario 6.

Table 3

Discriminant function analysis of firms

using other and declining balance depreciation methods

Significant variables in custom model		Function coefficients (C_{jp}) Other	DB	Significance of Wilk's Lambda
Continuous variables	CAP/REV	.377	-.046	.0001
	EQUITY (mil)	2.376	1.008	.0008
	TDE	.073	.127	.0000
Categorical variable	CHANGE	2.265	2.701	.0000
Sample size (N)		172	83	
Group means		.236	-.489	
Canonical correlation			.3229	
Chi-square and the significance level			27.645	.0000

Analysis and comparison of depreciation method models

In scenario 6, the variation explained by the custom model is .32. For scenario 5, the corresponding canonical correlations is .35. A comparison of the function coefficients reveals substantial similarity between the models. In both scenarios, firms with high CAP/REV and EQUITY are likely to use "other" (i.e., not declining balance) depreciation methods. Firms with high TDE are likely to choose declining balance methods. Also, the results for the categorical variables, CHANGE, are consistent.

There are no substantial differences between the two depreciation method models. Firms that use "other" depreciation methods are similar to firms that use straight-line depreciation when discriminating with declining balance firms. Therefore, for analytical purposes, we can assume that scenarios 5 and 6 are the same.

How should these results and similarities for scenario 5 and 6 be interpreted? EQUITY is very significant, which has not been reported in previous studies. More firms with large equity capital bases use straight-line depreciation methods. However, EQUITY is correlated with ASSETS (.59) and REV (.66), so the apparent significance might be a size effect. Nonetheless, EQUITY is a more important variable than ASSETS in these scenarios, indicating a refinement, but a contradiction, of the size hypothesis.

If EQUITY is considered a size variable, the results are not consistent with the size hypothesis, but they are consistent with the 1976 CCA Survey. The high frequency of use of straight-line depreciation methods by large equity-financed firms is probably due to the need for a simple depreciation method to use firm-wide. Further, tradition, transactions costs in changing methods, and the multiplicity of financial reporting objectives that large firms have likely influence the preference of straight-line methods.

On the other hand, small firms with low equity capital bases are less constrained, probably because they have fewer reporting objectives to meet. Small firms use declining balance methods more frequently, which may be because they are not tied to traditional straight-line methods. Also, the income tax objective is usually more important for small firms, and income tax considerations impact heavily on the choice of declining balance methods (Lambden, et al., 1975).

In both scenarios, CAP/REV tends to be high for firms that use "other" (not declining balance) depreciation methods. These results lead to the conclusion that capital intensive firms tend to use straight-line depreciation methods. This is inconsistent with

the hypothesis that capital intensive firms have an incentive to choose accounting principles that will reduce reported income because their total cost of capital is not recognized as an expense. Perhaps the capital intensity results are linked to a size factor, as large firms are usually more capital intensive than small firms. However, resource and utility sector firms are not included in the sample, making this possibility less likely.

In conclusion, the analyses of the method scenarios reveals that two variables TDE and EQUITY, not previously disclosed in positive accounting theory literature, are significant in choosing depreciation methods. Also, there is inconsistency with the size hypothesis, the debt/equity hypothesis, when total debt is used, and the capital intensity hypothesis.

Appendix 9—Logistic regression

Logistic regression is a form of multiple regression analysis that can be used to analyze the relationship between a dichotomous dependent variable and several independent variables. The objective of logistic regression is to use independent variables, whose values are known, to predict the dependent value. The dependent variable is dummy-coded in logistic regression analysis, whereas the dependent variable is continuous in multiple regression.

Logistic regression is very similar to discriminant analysis, as both use a regression equation with independent variables to describe or predict group membership. Discriminant analysis is a useful multivariate procedure when there are two or more categorical dependent variables, but logistic regression is only used when there are two groups. For both procedures, when there are only two groups, the dependent variables are dummy-coded as 0 and 1.

The result of applying logistic regression techniques to the data set is an equation that represents a best-fit line between the dichotomous dependent variable and the continuous independent variables. The logistic regression solution takes the form of:

$$X_j = A + B_{j1}Y_1 + B_{j1}Y_2 + \ldots + B_{jp}Y_p$$

where,

X is the predicted value,

j is the dichotomous group (0 or 1),

B is the regression coefficient (weight) assigned to each independent variable, and

p is the number of independent variables.

The regression coefficients are proportional to the discriminant function coefficients c_{j0}, c_{j1},..., c_{jp} (see Chapter 4). To determine the relationship between logistic regression and discriminant analysis, a correlation coefficient *R* is calculated, with the value being related to the discriminant function score (D^2) by the following formula:

$$D^2 = \left[\frac{R^2}{1-R^2}\right]\left[\frac{[N_0+N_1][N_0+N_1-2]}{N_0 \times N_1}\right]$$

where,

D^2 is the discriminant function score,

R is the correlation coefficient, and

N is the number of firms in each group.

Therefore, a useful connection exists between regression and discriminant analyses. "In practice, the logistic regression model and discriminant function analysis are often both used and the results compared" (Jobson, 1989).

Discriminant analysis is also comparable to analysis of variance (ANOVA). In discriminant analysis, the single dependent variables is categorical and the independent variables are continuous. The opposite is true of ANOVA, which involves continuous dependent variables and a single categorical independent variable.

Each of the six change and method scenarios were analyzed using logistic regression. The coefficients for the significant variables, at the .05 level, and the t-Statistics in the custom logistic regression model are summarized in Table 26, along with the R-Squares, ANOVA F-values, and significance of the F-values.

Table 26

Significant variables in the custom logistic regression model

	Coefficients of variables (significance of t-statistics in brackets)					
Significant variables (at .05 level)	Income decrease v. Income increase	No method change v. Method change	Income. increase v. Other	Income decrease v. Other	SL v. DB	Other methods v. DB
CAP/REV (T-stat)					-.0778 (.0488)	-.0837 (.0020)
TDE	-.0143 (.0405)				.0181 (.0013)	.0111 (.0087)
CHANGE	n/a	n/a	n/a	n/a		.0843 (.0491)
METHOD		-.0895 (.0143)		.0828 (.0074)	n/a	n/a
R-Square	.1014	.0412	.0255	.0492	.1263	.1069
ANOVA - F-value	2.012	1.7763	1.0834	2.1391	4.9132	4.9476
Significance of F-value	.0702	.1044	.3728	.0496	.0001	.0001

These logistic regression results are compared with the discriminant analysis results at the end of Chapter 5.

B45925